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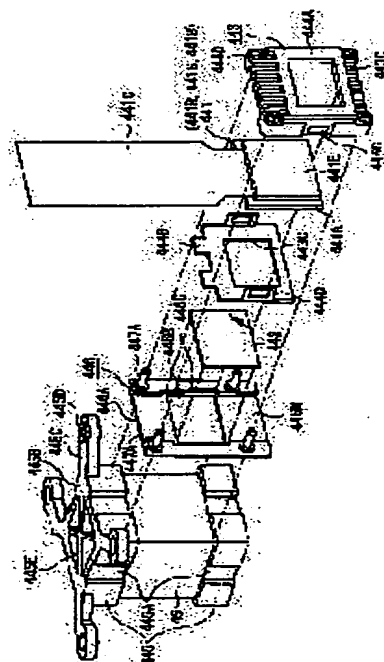
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(4) OPTICAL DEVICE, ITS MANUFACTURING METHOD, AND PROJECTOR

(7)Abstract:

PROBLEM TO BE SOLVED: To miniaturize a projector, to reduce the manufacturing cost, and to improve the picture quality by simplifying a POP structure for integrating an optical modulator and color synthesizing optical elements into one body.

SOLUTION: With respect to the POP structure, pins 447A integrally formed in a holding member 446 are inserted through holes 443D formed at four corners of a holding frame 443 for storing liquid crystal panels 41R, 441G, and 441B, and the holding frame 443 and the holding member 446 are fixed by adhesion, and the end face on the side opposite to the in 447A of the holding member 446 is adhered and fixed to a side face of pedestal 445 fixed to upper and lower faces of a cross dichroic prism 5.



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LAIMS

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Claim(s)

Claim 1] Two or more light modulation equipments which modulate two or more colored light according to image formation for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment, The plinth fixed at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, It is optical equipment which is equipped with the attachment component arranged between the aforementioned maintenance frame and the aforementioned plinth side, and is characterized by fixing the aforementioned light modulation equipment to the aforementioned plinth side through the aforementioned maintenance frame and the aforementioned attachment component.

Claim 2] in optical equipment according to claim 1, a hole is formed in at least two places of the aforementioned maintenance frame, and the aforementioned attachment component protrudes from opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and this rectangle plate -- having -- the above of the aforementioned maintenance frame -- the optical equipment characterized / having the pin inserted in a hole

Claim 3] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 2.

Claim 4] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 3.

Claim 5] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 2.

Claim 6] It is optical equipment characterized by the nose-of-cam side having the narrow configuration rather than the end face side in optical equipment according to claim 5, as for the aforementioned pin.

Claim 7] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 5.

Claim 8] Optical equipment characterized by forming notching for the behavior difference absorption between heat in the aforementioned rectangle plate in optical equipment according to claim 2 to 7.

Claim 9] It is optical equipment characterized by to have the piece of standing up of the letter of the transverse-plane abbreviation for L characters which is located in the square corner portions of the rectangle plate with which opening was formed in the position where the aforementioned attachment component corresponds with opening of the aforementioned maintenance frame in optical equipment according to claim 1, and this rectangle plate, protrudes so that it may be prolonged along with the edge of this rectangle plate, and holds the periphery of the aforementioned maintenance frame.

Claim 10] It is optical equipment characterized by the aforementioned piece of standing up protruding on the four corners of the rectangle plate of the aforementioned attachment component in optical equipment according to claim 9.

Claim 11] in optical equipment according to claim 9, the aforementioned piece of standing up is prepared along the side of an parallel couple mutually [ the aforementioned rectangle plate ] -- having -- the aforementioned side of a rectangle plate, and abbreviation -- the optical equipment characterized by having the same length

Claim 12] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 9 to 11.

Claim 13] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 12.

Claim 14] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 9 to 11.

Claim 15] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 14.

Claim 16] Optical equipment characterized by forming notching for the behavior difference absorption between heat and the aforementioned rectangle plate in optical equipment according to claim 9 to 15.

Claim 17] It is optical equipment characterized by having the engagement slot where the aforementioned attachment component engages with the optical element of a tabular in optical equipment according to claim 1 to 16.

Claim 18] It is optical equipment characterized by having the back face for the aforementioned attachment component fixing an optical element in optical equipment according to claim 1 to 16.

Claim 19] It is optical equipment which the 1st back face for fixing the 1st optical element to the aforementioned attachment component in optical equipment according to claim 1 to 16 and the 2nd back face for fixing the 2nd optical element are formed, and is characterized by being constituted so that the direction positions of the outside of a field of view differ mutually [ the 1st back face of the above, and the 2nd back face of the above ].

Claim 20] It is optical equipment characterized by being fixed to the both sides of the end face of a couple to which the aforementioned plinth intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 1 to 19.

Claim 21] The aforementioned plinth is optical equipment characterized by forming the crevice in a part of end face of which adhesion fixation of the aforementioned attachment component is carried out in optical equipment according to claim 20.

Claim 22] It is optical equipment characterized by having projected the side of the aforementioned plinth in optical equipment according to claim 20 or 21 rather than the flux of light incidence end face of the aforementioned tone Narimitsu study element.

Claim 23] It is optical equipment which is fixed only to one side among the end faces of the couple to which the aforementioned plinth intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 1 to 19, and is characterized by preparing the connection member which connects the aforementioned attachment components which counter near the aforementioned end face of another device.

Claim 24] optical equipment according to claim 23 -- setting -- the aforementioned plinth, the aforementioned attachment component, and the aforementioned connection -- the optical equipment with which at least two of the members are characterized by really being fabricated

Claim 25] It is optical equipment which is attached in the case for optics which arranges the optic from which this optical equipment constitutes an optical instrument in optical equipment according to claim 1 to 24 along with a predetermined optical axis, and is characterized by forming the attachment section fixed to the aforementioned case for optics at least at one side of the aforementioned plinth.

Claim 26] It is optical equipment characterized by consisting of a concave frame with which the aforementioned maintenance frame contains the aforementioned light modulation equipment in optical equipment according to claim 1 to 25, and a support plate which carries out press fixation of the contained light modulation equipment.

Claim 27] It is optical equipment characterized by having the light-transmission nature protection-against-dust board which the aforementioned light modulation equipment fixed at least to one side of the substrate of a couple, and the substrate of the aforementioned couple in optical equipment according to claim 1 to 26.

Claim 28] The projector characterized by having optical equipment according to claim 1 to 27 and the projection lens which projects the picture formed by the aforementioned optical equipment.

Claim 29] Two or more light modulation equipments which modulate two or more colored light according to image information for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image information field of this light modulation equipment, It is optical equipment which is equipped with the attachment component directly fixed to the flux of light incidence end face of the aforementioned tone Narimitsu study element, and is characterized by fixing the aforementioned maintenance frame directly to the aforementioned attachment component.

Claim 30] in optical equipment according to claim 29, a hole is formed in at least two places of the aforementioned maintenance frame, and the aforementioned attachment component protrudes from opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and the

orementioned rectangle plate -- having -- the above of the aforementioned maintenance frame -- the optical equipment characterized by having the pin inserted in a hole

Claim 31] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 30.

Claim 32] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 31.

Claim 33] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 30.

Claim 34] It is optical equipment characterized by the nose-of-cam side having the narrow configuration rather than the end face side in optical equipment according to claim 33, as for the aforementioned pin.

Claim 35] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 30.

Claim 36] Optical equipment characterized by forming notching for the behavior difference absorption between heat and the aforementioned rectangle plate in optical equipment according to claim 30 to 35.

Claim 37] It is optical equipment characterized by to have the piece of standing up of the letter of the transverse-plane abbreviation for L characters which is located in the square corner portions of the rectangle plate with which opening is formed in the position where the aforementioned attachment component corresponds with opening of the aforementioned maintenance frame in optical equipment according to claim 30, and this rectangle plate, protrudes so that it may be prolonged along with the edge of this rectangle plate, and holds the periphery of the aforementioned maintenance frame.

Claim 38] It is optical equipment characterized by the aforementioned piece of standing up protruding on the four corners of the rectangle plate of the aforementioned attachment component in optical equipment according to claim 37.

Claim 39] in optical equipment according to claim 37, the aforementioned piece of standing up is prepared along the side of an parallel couple mutually [ the aforementioned rectangle plate ] -- having -- the aforementioned side of a rectangle plate, and abbreviation -- the optical equipment characterized by having the same length

Claim 40] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 37 to 39.

Claim 41] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 40.

Claim 42] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 37 to 39.

Claim 43] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 42.

Claim 44] Optical equipment characterized by forming notching for the behavior difference absorption between heat and the aforementioned rectangle plate in optical equipment according to claim 37 to 43.

Claim 45] It is optical equipment characterized by having the engagement slot where the aforementioned attachment component engages with the optical element of a tabular in optical equipment according to claim 29 to 44.

Claim 46] It is optical equipment characterized by having the back face for the aforementioned attachment component fixing an optical element in optical equipment according to claim 29 to 44.

Claim 47] It is optical equipment which the 1st back face for the aforementioned attachment component fixing the 1st optical element in optical equipment according to claim 29 to 44 and the 2nd back face for fixing the 2nd optical element are formed, and is characterized by being constituted so that the direction positions of the outside of a field may differ mutually [ the 1st back face of the above, and the 2nd back face of the above ].

Claim 48] It is optical equipment characterized by for the aforementioned attachment component having heights in the plane of composition with the aforementioned tone Narimitsu study element in optical equipment according to claim 29 to 47, and forming a partial crevice between the aforementioned tone Narimitsu study element and the aforementioned attachment component of the aforementioned tone Narimitsu study element and the aforementioned heights.

Claim 49] The inside of the end face of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 29 to 48, It has the plinth fixed at least to one side. this optical equipment Optical equipment which is attached in the case for optics which arranges the optic which constitutes an optical instrument through the aforementioned plinth along with a predetermined optical

xis, and is characterized by forming in the aforementioned plinth the attachment section fixed to the aforementioned case for optics.

Claim 50] It is optical equipment characterized by consisting of a concave frame with which the aforementioned maintenance frame contains the aforementioned light modulation equipment in optical equipment according to claim 9 to 49, and a support plate which carries out press fixation of the contained light modulation equipment.

Claim 51] It is optical equipment characterized by having the light-transmission nature protection-against-dust board which the aforementioned light modulation equipment fixed at least to one side of the substrate of a couple, and the substrate of the aforementioned couple in optical equipment according to claim 29 to 50.

Claim 52] The projector characterized by having optical equipment according to claim 29 to 51 and the projection lens which projects the picture formed by the aforementioned optical equipment.

Claim 53] It is optical equipment characterized by fixing the aforementioned maintenance frame to the aforementioned attachment component through the aforementioned spacer by having the following and having the attachment component directly fixed to the flux of light incidence end face of the aforementioned tone Narimitsu study element, and the spacer arranged between the aforementioned maintenance frame and the aforementioned piece of standing up of the aforementioned attachment component. Two or more light modulation equipments which modulate two or more colored light according to image information for every colored light. The maintenance frame which the one Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment. The piece of standing up formed so that the side edge of the aforementioned maintenance frame might be covered. The piece of support which supports the field by the side of the aforementioned tone Narimitsu study element of the aforementioned maintenance frame.

Claim 54] It is optical equipment characterized by consisting of a concave frame with which the aforementioned maintenance frame contains the aforementioned light modulation equipment in optical equipment according to claim 3, and a support plate which carries out press fixation of the contained light modulation equipment.

Claim 55] It is optical equipment which the aforementioned maintenance frame is constituted in optical equipment according to claim 53 by the supporter material which supports the optical incidence side of the aforementioned light modulation equipment, and is characterized by the irradiation appearance side of the aforementioned light modulation equipment being held by the aforementioned attachment component.

Claim 56] It is optical equipment characterized by forming the aforementioned spacer in optical equipment according to claim 55 between the optical injection side of the aforementioned light modulation equipment, and the field by the side of the aforementioned light modulation equipment of the aforementioned attachment component.

Claim 57] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 53 to 56.

Claim 58] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 57.

Claim 59] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 53 to 56.

Claim 60] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 59.

Claim 61] It is optical equipment characterized by for the aforementioned attachment component having heights in the plane of composition with the aforementioned tone Narimitsu study element in optical equipment according to claim 3 to 60, and forming a partial crevice between the aforementioned tone Narimitsu study element and the aforementioned attachment component of the aforementioned tone Narimitsu study element and the aforementioned heights.

Claim 62] The inside of the end face of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 53 to 61, It has the plinth fixed at least to one side. this optical equipment Optical equipment which is attached in the case for optics which arranges the optic which constitutes an optical instrument through the aforementioned plinth along with a predetermined optical axis, and is characterized by forming in the aforementioned plinth the attachment section fixed to the aforementioned case for optics.

Claim 63] It is optical equipment characterized by having the light-transmission nature protection-against-dust board which the aforementioned light modulation equipment fixed at least to one side of the substrate of a couple, and the substrate of the aforementioned couple in optical equipment according to claim 53 to 62.

Claim 64] The projector characterized by having optical equipment according to claim 53 to 63 and the projection lens which projects the picture formed by the aforementioned optical equipment.

Claim 65] It is optical equipment characterized by fixing the aforementioned maintenance frame to the aforementioned attachment component through the aforementioned spacer by having the following and having the attachment component directly fixed to the aforementioned plinth, and the spacer arranged between the aforementioned maintenance frame and the aforementioned piece of standing up of the aforementioned attachment component. Two or more light modulation equipments which modulate two or more colored light according to image information for every colored light. The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment. The plinth fixed at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element. The piece of standing up formed so that the side edge of the aforementioned maintenance frame might be covered, and the piece of support which supports the field by the side of the aforementioned tone Narimitsu study element of the aforementioned maintenance frame.

Claim 66] It is optical equipment characterized by consisting of a concave frame with which the aforementioned maintenance frame contains the aforementioned light modulation equipment in optical equipment according to claim 65, and a support plate which carries out press fixation of the contained light modulation equipment.

Claim 67] It is optical equipment which the aforementioned maintenance frame is constituted in optical equipment according to claim 65 by the supporter material which supports the optical incidence side of the aforementioned light modulation equipment, and is characterized by the irradiation appearance side of the aforementioned light modulation equipment being held by the aforementioned attachment component.

Claim 68] It is optical equipment characterized by forming the aforementioned spacer in optical equipment according to claim 67 between the optical injection side of the aforementioned light modulation equipment, and the field by the side of the aforementioned light modulation equipment of the aforementioned attachment component.

Claim 69] It is optical equipment characterized by being constituted by the material into which the aforementioned attachment component has light-transmission nature in optical equipment according to claim 65 to 68.

Claim 70] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by optical hardening type adhesives in optical equipment according to claim 69.

Claim 71] It is optical equipment characterized by constituting the aforementioned attachment component with the metal in optical equipment according to claim 65 to 68.

Claim 72] It is optical equipment characterized by fixing the aforementioned maintenance frame and the aforementioned attachment component by heat-hardened type adhesives in optical equipment according to claim 71.

Claim 73] It is optical equipment characterized by being fixed to the both sides of the end face of a couple to which the aforementioned plinth intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 65 to 72.

Claim 74] The aforementioned plinth is optical equipment characterized by forming the crevice in a part of end face by which adhesion fixation of the aforementioned attachment component is carried out in optical equipment according to claim 73.

Claim 75] It is optical equipment characterized by having projected the side of the aforementioned plinth in optical equipment according to claim 73 or 74 rather than the flux of light incidence end face of the aforementioned tone Narimitsu study element.

Claim 76] It is optical equipment which is fixed only to one side among the end faces of the couple to which the aforementioned plinth intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in optical equipment according to claim 65 to 75, and is characterized by preparing the connection member which connects the aforementioned attachment components which counter near the aforementioned end face of another side.

Claim 77] optical equipment according to claim 76 -- setting -- the aforementioned plinth, the aforementioned attachment component, and the aforementioned connection -- the optical equipment with which at least two of members are characterized by really being fabricated

Claim 78] It is optical equipment which is attached in the case for optics which arranges the optic from which this optical equipment constitutes an optical instrument in optical equipment according to claim 65 to 77 along with a predetermined optical axis, and is characterized by forming the attachment section fixed to the aforementioned case for optics at least at one side of the aforementioned plinth.

Claim 79] It is optical equipment characterized by having the light-transmission nature protection-against-dust board which the aforementioned light modulation equipment fixed at least to one side of the substrate of a couple, and the substrate of the aforementioned couple in optical equipment according to claim 65 to 78.

Claim 80] The projector characterized by having optical equipment according to claim 65 to 79 and the projection lens which projects the picture formed by the aforementioned optical equipment.

Claim 81] Two or more light modulation equipments which modulate two or more colored light according to image information for every colored light, The plinth fixed process which is the manufacture method of optical equipment that the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment was unified, and fixes a plinth at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, The process which equips a maintenance frame with two or more aforementioned light modulation equipments respectively, and the maintenance frame wearing process of using adhesives for an attachment component and sticking the aforementioned maintenance frame to it, The aforementioned attachment component in the attachment component wearing process of using and sticking adhesives to the aforementioned plinth side, and the state [ \*\*\*\* / un-/ the aforementioned adhesives ] Have the justification process which adjusts the position of two or more aforementioned light modulation equipments, and the adhesive setting process which stiffens the aforementioned adhesives after the aforementioned justification process, and it sets at the aforementioned justification process. When the X-axis and a Y-axis are set as biaxial [ which intersects a predetermined optical axis perpendicularly with the Z-axis and the aforementioned Z-axis ], adjustment of Z shaft orientations and the hand of cut consisting mainly of the X-axis and a Y-axis It is the manufacture method of the optical equipment characterized by being carried out between the aforementioned maintenance frame and the aforementioned attachment component, and performing adjustment of X shaft orientations, Y shaft orientations, and the hand of cut within XY side between the aforementioned attachment component and the aforementioned plinth.

Claim 82] It is the manufacture method of the optical equipment characterized by to have the process which inserts the spacer which applied adhesives between the aforementioned light-modulation equipment and the aforementioned attachment component before the aforementioned justification process in the manufacture method of optical equipment according to claim 81, and to be performed adjustment of the aforementioned Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis through the aforementioned spacer between the aforementioned maintenance frame and the aforementioned attachment component.

Claim 83] Have the following, and in the aforementioned justification process, when the X-axis and the Y-axis are set as biaxial [ which intersects a predetermined optical axis perpendicularly with the Z-axis and the aforementioned Z-axis ], adjustment of Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis It is the manufacture method of the optical equipment characterized by being carried out between the aforementioned maintenance frame and the aforementioned attachment component, and performing adjustment of X shaft orientations, Y shaft orientations, and the hand of cut within XY side between the aforementioned attachment component and the flux of light incidence end face of the aforementioned color composition element. Two or more light modulation equipments which modulate two or more colored light according to image information for every colored light. The process which is the manufacture method of optical equipment that the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment was unified, and equips a maintenance frame with two or more aforementioned light modulation equipments respectively. The maintenance frame wearing process of using adhesives for an attachment component and sticking the aforementioned maintenance frame to it. The attachment component wearing process of using adhesives for the flux of light incidence end face of the aforementioned tone Narimitsu study element, and sticking the aforementioned attachment component to it, the justification process which adjusts the position of two or more aforementioned light modulation equipments in the state \*\*\*\* / un-/ the aforementioned adhesives ], and the adhesive setting process which stiffens the aforementioned adhesives after the aforementioned justification process.

Claim 84] It is the manufacture method of the optical equipment characterized by to have the process which inserts the spacer which applied adhesives between the aforementioned light-modulation equipment and the aforementioned attachment component before the aforementioned justification process in the manufacture method of optical equipment according to claim 83, and to be performed adjustment of the aforementioned Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis through the aforementioned spacer between the aforementioned maintenance frame and the aforementioned attachment component.



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## ETAILED DESCRIPTION

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### Detailed Description of the Invention]

0001]

The technical field to which invention belongs] this invention relates to the optical equipment with which the light modulation equipment which modulates colored light according to image information, and the tone Narimitsu study element which compounds the colored light modulated with light modulation equipment were unified, the manufacture method of the optical equipment, and the projector which adopted the optical equipment.

0002]

background of the Invention] While the color separation optical system using the dichroic mirror etc. separates into the colored light of red in three primary colors, green, and blue the flux of light injected from the light source from the mirror, according to image information, it becomes irregular for every colored light with three light modulation equipments using the liquid crystal panel etc., each colored light after a picture modulation is compounded with a cross dichroic prism, and the so-called projector of the 3 board type which carries out expansion projection of the color picture through a projection lens is known.

0003] At such a projector, each light modulation equipment must be in the position of the back focus of a projection lens. Moreover, since one display pixel is formed of the additive mixture of colors of red, green, and blue in three primary colors, in order to acquire a clearer picture, it is necessary to prevent generating of the pixel gap between each liquid crystal panel, and a gap of the distance from a projection lens. You have to perform focal adjustment which ranges each light modulation equipment correctly in the position of the back focus of a projection lens at the time of manufacture of a projector, and alignment adjustment which makes the pixel of each light modulation equipment in agreement with high precision. When the X-axis and a Y-axis are set as biaxial [ which intersects perpendicularly a predetermined optical axis (usually optical axis of a projection lens) with the Z-axis and this ] here, adjustment of Z shaft orientations, the hand of cut (the direction of Xtheta) centering on the X-axis, and the hand of cut (the direction of theta) centering on a Y-axis is included in focal adjustment. Moreover, adjustment of X shaft orientations, Y shaft orientations, and the hand of cut within XY side (the direction of theta) is included in alignment adjustment. For this reason, after justifying light modulation equipment conventionally, the optical equipment directly fixed to the flux of light incidence end face of a cross dichroic prism is adopted.

0004] According to such optical equipment, the mutual position of each light modulation equipment and the focal position to a projection lens can be adjusted with high precision through a cross dichroic prism. Therefore, in case optical instruments, such as a projector, are assembled, compared with the case where justify individually a cross dichroic prism and three light modulation equipments, and it fixes in a device, the time and effort of adjustment can be mitigated sharply.

0005] thus, as structure of the optical equipment which unified a cross dichroic prism and light modulation equipment for example, as indicated by JP,2000-221588,A, contain light modulation equipment in the maintenance frame with which the hole was formed in four corners, and the pin which applied adhesives to the circumference is inserted in the hole. There are some which carry out adhesion fixation of the end face of a pin, the flux of light incidence end face of a cross dichroic prism and the side of a pin, and the hole of a maintenance frame mutually (the so-called pin spacer method POP (Panel On Prism) structure).

0006] Moreover, as indicated by JP,10-10994,A, while containing light modulation equipment in a maintenance frame for example, the frame-like attachment member is pasted up on the flux of light incidence end face of a cross dichroic prism, the middle frame of a tabular is further fixed with screws to this attachment member, and there are some which carry out adhesion fixation mutually through the spacer which consists a maintenance frame and a middle frame member of a wedge-shaped configuration (the so-called triangular spacer method POP structure).

0007]



Problem(s) to be Solved by the Invention] However, all, since it carries out adhesion fixation of the light modulation equipment through a pin, an attachment member, and a spacer at the flux of light incidence end face of a cross dichroic prism, the conventional POP structure has many part mark, and since structure is also complicated, it has the problem that manufacture is comparatively difficult. Such a problem may lead to prevention of a miniaturization of optical equipment, and the increase in a manufacturing cost as a result. moreover, the conventional POP structure -- each -- the flux of light incidence end face of a cross dichroic prism -- a pin and attachment -- since it is what fixes light modulation equipment through a member etc., it is necessary to have sufficient area for the flux of light incidence end face of prism to fix light modulation equipment. Therefore, a cross dichroic prism cannot be miniaturized. Such a problem may lead to prevention of a miniaturization of optical equipment, and the increase in a manufacturing cost as a result.

[0008] Furthermore, with the POP structure of a pin spacer method, when exchanging light modulation equipment by poor manufacture, failure, etc., in order that adhesives may remain in the flux of light incidence end face of a pin and a cross dichroic prism, it is necessary to remove these adhesives or to exchange the prism itself. Such a problem may lead to the increase in a manufacturing cost, or the fall of after-sale service nature as a result. With the conventional POP structure, the position of the light modulation equipment to the incidence end face of a cross dichroic prism is relatively determined through an attachment component, a pin, or a spacer further again. Therefore, while positioning of light modulation equipment is comparatively difficult, there is a problem that the influence a position gap of a pin and a spacer affects a position gap of light modulation equipment is large. Such a problem may lead to the increase in a manufacturing cost, and deterioration of picture quality as a result.

[0009] The purpose of this invention is to offer the manufacture method of the optical equipment which can solve at least one of the above-mentioned problems, and optical equipment, and a projector.

[010]

[Means for Solving the Problem] Two or more light modulation equipments with which the optical equipment concerning the 1st gestalt of this invention modulates two or more colored light according to image information for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment, The attachment component arranged between the plinth and the aforementioned maintenance frame which are fixed at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, and the aforementioned plinth side, \*\*\*\*\* and the aforementioned light modulation equipment are characterized by being fixed to the aforementioned plinth side through the aforementioned maintenance frame and the aforementioned attachment component.

[011] The optical equipment concerning the 1st gestalt of this invention has the following operation and effects.

1) In order not to use the pin or spacer which were constituted as independent parts like the conventional POP structure, there are few part mark. Moreover, structure is simple and manufacture is also easy structure. Therefore, it becomes possible to contribute to the miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost.

2) Since light modulation equipment is not fixed to the flux of light incidence end face of a tone Narimitsu study element but it fixes like the conventional POP structure to the flux of light incidence end face of a tone Narimitsu study element, and the side of the plinth fixed to the crossing end face, the space which fixes light modulation equipment to the flux of light incidence end face of a tone Narimitsu study element becomes unnecessary. Therefore, the size of a tone Narimitsu study element can be made small, and, thereby, miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost can be aimed at.

3) Moreover, like before, the position of light modulation equipment is not necessarily prescribed by the flux of light incidence end face of a tone Narimitsu study element, and comes to be prescribed by the plinth side. Therefore, size of the part tone Narimitsu study element can be made small. Thereby, miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost can be aimed at. Furthermore, since the back focus of a projection lens can be shortened when this optical equipment is adopted as a projector, much light can be understood with a projection lens and it becomes possible to acquire a bright projection picture.

[012] (D) Light modulation equipment is not further fixed to the flux of light incidence end face of a tone Narimitsu study element. Since it fixes to the flux of light incidence end face of a tone Narimitsu study element, and the side of the plinth fixed to the crossing end face, when exchange of light modulation equipment is needed the time of manufacture, and after manufacture, even if it removes light modulation equipment, a blemish is not attached to the flux of light incidence end face of a tone Narimitsu study element. Moreover, even if it is the case where light modulation equipment and the tone Narimitsu study element are being fixed by adhesion, after removing light

modulation equipment, it is not necessary to shave off the adhesives which fixed to the flux of light incidence end face of a tone Narimitsu study element. Therefore, it is possible to contribute to reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and improvement in after-sale service nature.

3) Since the position of light modulation equipment is decided only by physical relationship of an attachment component and a plinth through a pin or a spacer, positioning of light modulation equipment is easy for it, and it can so reduce a position gap of the light modulation equipment after justification further again. Therefore, it is possible to contribute to reduction of the manufacturing cost of the projector as which optical equipment, as a result this are adopted, and improvement in quality of image. In addition, it means that the attachment component is being fixed to the plinth side through members for justification, such as a spacer and a pin, saying "fix to the plinth side." Therefore, is contained in the 1st gestalt of this invention when silicon on sapphire, a metal plate, etc. of the sake on a thermolysis disposition intervene between the plinth side and an attachment component.

[013] In the optical equipment concerning the 1st gestalt of this invention, a hole is formed in at least two places of the aforementioned maintenance frame, and, as for the aforementioned attachment component, it is desirable to have opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and the pin which protrudes from this rectangle plate and is inserted in the hole of the four corners of the aforementioned maintenance frame. Since the pin which fixes a maintenance frame to an attachment component is prepared with such composition, as compared with the conventional POP structure, there are few part mark, and structure is simple and manufacture is also easy structure.

[014] Moreover, the aforementioned attachment component can be constituted by the material which has light-transmission nature at this time. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation of the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and a plinth for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

[015] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Thus, when a metal constitutes an attachment component, it is desirable that a nose-of-cam side makes a pin a narrow configuration rather than a end face side. Even when optical hardening adhesives are used for fixation of such a configuration then a maintenance frame, and an attachment component for a pin, it is possible by irradiating light from the end face side of a pin to stiffen adhesives for short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to stiffen adhesives with metaled good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

[016] Furthermore, if notching for the behavior difference absorption between heat is formed in the aforementioned rectangle plate which constitutes the aforementioned attachment component, though thermal stress will be applied to it with the heat generated with optical equipment at an attachment component, deformation of the appearance configuration of an attachment component can be eased. Therefore, it is possible to avoid a position gap of the light modulation equipment by heat. Since it is possible to hold the position of the light modulation equipment after justification in the suitable state when this optical equipment is especially used for a projector, a pixel gap of a projection picture can be avoided and it becomes possible to acquire a quality picture.

[017] As for the aforementioned attachment component, in the optical equipment concerning the 1st form of this invention, it is desirable to have opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and the piece of standing up of the letter of the transverse-plane abbreviation for L characters which is located in the square corner portion of this rectangle plate, protrudes so that it may be prolonged along with the edge of this rectangle plate, and holds the periphery of the aforementioned maintenance frame. Since the piece of standing up holding a maintenance frame is prepared in the attachment

component with such composition, as compared with the conventional POP structure, there are few part mark, and structure is simple and manufacture is also easy structure. If the aforementioned piece of standing up is protruded on the four corners of the rectangle plate of the aforementioned attachment component at this time, the influence of external force can be eased and stable maintenance can be performed. on the other hand -- the aforementioned piece of standing up -- the aforementioned rectangle plate -- mutual -- the side of an parallel couple -- meeting -- preparing -- the side of a rectangle plate, and abbreviation -- if the same length is given, the light which leaks from between an attachment component and light modulation equipment can be intercepted Therefore, since it can prevent that the light which leaked within optical equipment is understood by the projection lens, the contrast of a projection picture falls or picture fades when this optical equipment is used for a projector, it becomes possible to acquire a quality picture.

[018] Moreover, the aforementioned attachment component can be constituted by the material which has light-transmission nature at this time. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation of the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and a plinth for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

[019] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Since it can manufacture easily by sheet metal work when forming the attachment component of such a configuration with a metal, it leads to cost reduction. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to affix adhesives with metaled good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

[020] Furthermore, if notching for the behavior difference absorption between heat is formed in the aforementioned rectangle plate which constitutes the aforementioned attachment component, though thermal stress will be applied to it with the heat generated with optical equipment at an attachment component, deformation of the appearance configuration of an attachment component can be eased. Therefore, it is possible to avoid a position gap of the light modulation equipment by heat. Since it is possible to hold the position of light modulation equipment in the suitable state when this optical equipment is especially used for a projector, a pixel gap of a projection picture can be avoided and it becomes possible to acquire a quality picture.

[021] As for the aforementioned attachment component, in the optical equipment concerning the 1st gestalt of this invention, it is desirable to have the engagement slot which engages with the optical element of a tabular. Thus, since the fixed mechanism for arranging the optical element of a tabular between light modulation equipment and a tone narimitsu study element by preparing the structure for holding the optical element of a tabular in an attachment component becomes unnecessary, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be promoted. In addition, as an optical element of such a tabular, a polarizing plate, a phase contrast board, an optical compensating plate, etc. are mentioned. Moreover, as for the aforementioned attachment component, in the optical equipment concerning the 1st gestalt of this invention, it is desirable to have the back face for fixing an optical element. Thus, since the fixed mechanism for arranging an optical element between light modulation equipment and a tone Narimitsu study element by preparing the structure for supporting an optical element in an attachment component becomes unnecessary, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be promoted.

[022] Furthermore, in the optical equipment concerning the 1st gestalt of this invention, the 1st back face for fixing the 1st optical element to the aforementioned attachment component and the 2nd back face for fixing the 2nd optical element are prepared, and, as for the 1st back face of the above, and the 2nd back face of the above, it is desirable to be constituted so that the direction positions of the outside of a field may differ mutually. Thus, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be further promoted by preparing the structure for supporting two or more optical elements in a different position in an attachment component. In addition, as an optical element fixed to the above-mentioned back face, a polarizing plate, a phase contrast board, an optical compensating plate, a condenser lens, etc. are mentioned.

023] The aforementioned plinth can be fixed to the both sides of the end face of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in the optical equipment concerning the 1st gestalt of this invention. If the aforementioned attachment component of a plinth formed the crevice in a part of end face by which adhesion fixation is carried out at this time, when exchange of light modulation equipment is needed the time of manufacture, and after manufacture, it becomes possible to remove light modulation equipment easily. That is, maintenance tools, such as a driver, can be fitted over the crevice formed in the plinth side, the work which tears off an attachment component and a tone Narimitsu study element becomes easy. Therefore, it is possible to contribute to the further reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and the further improvement in after-sale service nature. Moreover, as for the side of the aforementioned plinth, it is desirable at this time to have projected rather than the flux of light incidence end face of the aforementioned tone Narimitsu study element. When it fixes such composition, then an attachment component to the plinth side by adhesion, even if adhesives overflow a plane of composition, the adhesives which overflowed with lobes can be received. Therefore, it is possible to prevent that adhesives begin to leak to the flux of light incidence end face of a tone Narimitsu study element. Therefore, when this optical element is adopted as optical instruments, such as a projector, it is possible to contribute to the further improvement in quality of image.

024] In the optical equipment concerning the 1st gestalt of this invention, it is possible to prepare the connection member which connects the aforementioned attachment components which fix the aforementioned plinth only to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone narimitsu study element, and counter near the aforementioned end face of another side. the case where it considers as such composition -- the aforementioned plinth, the aforementioned attachment component, and the aforementioned connection -- the further simplification of structure and shortening of a manufacturing process are attained by really considering at least two of members as fabrication Therefore, it becomes possible to contribute to the further miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and the further reduction of a manufacturing cost. In addition, if the coefficient of thermal expansion of mold goods and the tone narimitsu study element attached there is made to really [ this ] approximate in this case, distortion by heat will be suppressed. Therefore, since it is possible to hold the position of light modulation equipment in the suitable state, a pixel gap of a projection picture can be avoided and it becomes possible to acquire a quality picture.

025] As for this optical equipment, in the optical equipment concerning the 1st gestalt of this invention, it is desirable that it is attached in the case for optics which arranges the optic which constitutes an optical instrument along with a predetermined optical axis, and the attachment section fixed to the aforementioned case for optics is formed at least in one side of the aforementioned plinth. Thus, the space of the optical equipment circumference can be made small by preparing the attachment section to the case for optics in a plinth. Therefore, small and lightweight-ization of the optical instrument as which optical equipment is adopted can be promoted further.

026] As for the aforementioned maintenance frame, in the optical equipment concerning the 1st gestalt of this invention, it is desirable to consist of a concave frame which contains the aforementioned light modulation equipment, and a support plate which carries out press fixation of the contained light modulation equipment. Maintenance fixation / which light modulation equipment was stabilized in the maintenance frame while being able to perform easily receipt and fixation of such composition, then light modulation equipment can be performed. Moreover, as for the aforementioned light modulation equipment, it is desirable to have the light-transmission nature protection-against-dust board which fixed at least to one side of the substrate of a couple and the substrate of the aforementioned couple. If such a light-transmission nature protection-against-dust board is formed when optical equipment is adopted as a projector, even if a contaminant adheres to the front face of light modulation equipment, it is possible to make it hard to be conspicuous on a projection side. Therefore, it is possible to contribute to the further improvement in quality of image.

027] Two or more light modulation equipments with which the optical equipment concerning the 2nd form of this invention modulates two or more colored light according to image information for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment, has the attachment component directly fixed to the flux of light incidence end face of the aforementioned tone narimitsu study element, and the aforementioned maintenance frame is characterized by being directly fixed to the aforementioned attachment component.

028] The optical equipment concerning the 2nd gestalt of this invention has the following operation and effects.

1) In order not to use the pin or spacer which were constituted as independent parts like the conventional POP structure, there are few part mark. Moreover, structure is simple and manufacture is also easy structure. Therefore, it

comes possible to contribute to the miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost.

030] Since the position of light modulation equipment is decided only by physical relationship of an attachment component and the optical incidence end face of a tone Narimitsu study element through a pin or a spacer, positioning of light modulation equipment is easy for it, and it can also reduce a position gap of the light modulation equipment after justification further again. Therefore, it is possible to contribute to reduction of the manufacturing cost of the projector as which optical equipment, as a result this are adopted, and improvement in quality of image. In addition, "direct fixed" means that these members of each other are being fixed through members for justification, such as a spacer and a pin, between each part material to "-. Therefore, it is contained in the 2nd gestalt of this invention when silicon on sapphire and the metal plate of the sake on a thermolysis disposition intervene among these members. 029] in the optical equipment concerning the 2nd gestalt of this invention, a hole is formed in at least two places of the aforementioned maintenance frame, and the aforementioned attachment component protrudes from opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and this rectangle plate -- having -- the above of the aforementioned maintenance frame -- it is desirable to have the pin inserted in a hole Since the pin which fixes a maintenance frame to an attachment component is prepared with such composition, as compared with the conventional POP structure, there are few part mark, and structure is simple and manufacture is also easy structure.

030] Moreover, the aforementioned attachment component can be constituted by the material which has light-transmission nature at this time. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation with the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and the optical incidence end face of a tone Narimitsu study element for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

031] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Thus, when a metal constitutes an attachment component, it is desirable that a nose-of-cam side makes a pin a narrow configuration rather than a end face side. Even when optical hardening adhesives are used for fixation of such a configuration then a maintenance frame, and an attachment component for a pin, it is possible by irradiating light from the end face side of a pin to stiffen adhesives for short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to stiffen adhesives with metaled good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

032] Furthermore, if notching for the behavior difference absorption between heat is formed in the aforementioned rectangle plate which constitutes the aforementioned attachment component, though thermal stress will be applied to it with the heat generated with optical equipment at an attachment component, deformation of the appearance configuration of an attachment component can be eased. Therefore, it is possible to avoid a position gap of the light modulation equipment by heat. Since it is possible to hold the position of the light modulation equipment after justification in the suitable state when this optical equipment is especially used for a projector, a pixel gap of a rojection picture can be avoided and it becomes possible to acquire a quality picture.

033] As for the aforementioned attachment component, in the optical equipment concerning the 2nd gestalt of this invention, it is desirable to have opening of the aforementioned maintenance frame, the rectangle plate with which opening was formed in the corresponding position, and the piece of standing up of the letter of the transverse-plane abbreviation for L characters which is located in the square corner portion of this rectangle plate, protrudes so that it may be prolonged along with the edge of this rectangle plate, and holds the periphery of the aforementioned maintenance frame. Since the piece of standing up holding a maintenance frame is prepared in the attachment component with such composition, as compared with the conventional POP structure, there are few part mark, and structure is simple and manufacture is also easy structure. If the aforementioned piece of standing up is protruded on

the four corners of the rectangle plate of the aforementioned attachment component at this time, the influence of external force can be eased and stable maintenance can be performed. On the other hand -- the aforementioned piece of standing up -- the aforementioned rectangle plate -- mutual -- the side of an parallel couple -- meeting -- preparing -- the side of a rectangle plate, and abbreviation -- if the same length is given, the light which leaks from between an attachment component and light modulation equipment can be intercepted. Therefore, since it can prevent that the light which leaked within optical equipment is understood by the projection lens, the contrast of a projection picture falls or picture fades when this optical equipment is used for a projector, it becomes possible to acquire a quality picture. [034] Moreover, the aforementioned attachment component can be constituted by the material which has light-transmission nature at this time. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation with the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and the optical incidence end face of a tone Narimitsu study element for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

[035] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Since it can manufacture easily by sheet metal work when forming the attachment component of such a configuration with a metal, it leads to cost reduction. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to affix adhesives with metal good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

[036] Furthermore, if notching for the behavior difference absorption between heat is formed in the aforementioned rectangle plate which constitutes the aforementioned attachment component, though thermal stress will be applied to it with the heat generated with optical equipment at an attachment component, deformation of the appearance configuration of an attachment component can be eased. Therefore, it is possible to avoid a position gap of the light modulation equipment by heat. Since it is possible to hold the position of light modulation equipment in the suitable state when this optical equipment is especially used for a projector, a pixel gap of a projection picture can be avoided and it becomes possible to acquire a quality picture.

[037] As for the aforementioned attachment component, in the optical equipment concerning the 2nd gestalt of this invention, it is desirable to have the engagement slot which engages with the optical element of a tabular. Thus, since the fixed mechanism for arranging the optical element of a tabular between light modulation equipment and a tone narimitsu study element by preparing the structure for holding the optical element of a tabular in an attachment component becomes unnecessary, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be promoted. In addition, as an optical element of such a tabular, a polarizing plate, a phase contrast board, an optical compensating plate, etc. are mentioned. Moreover, as for the aforementioned attachment component, in the optical equipment concerning the 2nd gestalt of this invention, it is desirable to have the back face for fixing an optical element. Thus, since the fixed mechanism for arranging an optical element between light modulation equipment and a tone Narimitsu study element by preparing the structure for supporting an optical element in an attachment component becomes unnecessary, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be promoted.

[038] Furthermore, in the optical equipment concerning the 2nd form of this invention, the 1st back face for fixing the optical element to the aforementioned attachment component and the 2nd back face for fixing the 2nd optical element are prepared, and, as for the 1st back face of the above, and the 2nd back face of the above, it is desirable to be constituted so that the direction positions of the outside of a field may differ mutually. Thus, optical equipment as a result the cost reduction of the optical instrument as which this is adopted, and small and lightweight-izing can be further promoted by preparing the structure for supporting two or more optical elements in a different position in an attachment component. In addition, as an optical element fixed to the above-mentioned back face, a polarizing plate, a phase contrast board, an optical compensating plate, a condenser lens, etc. are mentioned.

[039] In the optical equipment concerning the 2nd form of this invention, the aforementioned attachment component is heights in the plane of composition with the aforementioned tone Narimitsu study element, and it is desirable that a



artial crevice is formed between the aforementioned tone Narimitsu study element and the aforementioned attachment component of the aforementioned tone Narimitsu study element and the aforementioned heights. When exchange of light modulation equipment is needed the time of such composition, then manufacture, and after manufacture, it becomes possible to remove light modulation equipment easily using the crevice formed between the aforementioned tone Narimitsu study element and the aforementioned attachment component. That is, since tools, such as a driver, can be fitted over this crevice, the work which tears off an attachment component and a tone Narimitsu study element becomes easy. Therefore, it is possible to contribute to reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and improvement in after-sale service nature. Moreover, since this crevice forms the air course for cooling optical elements, such as a polarizing plate arranged at light modulation equipment or its periphery, it becomes possible [ preventing degradation by the heat of the optical element arranged at light modulation equipment or its periphery ], and contributes to improvement in quality of image.

[040] It has the plinth fixed at least to one side in the optical equipment concerning the 2nd form of this invention among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element. this optical equipment It is attached in the case for optics which arranges the optic which constitutes an optical instrument through the aforementioned plinth along with a predetermined optical axis, and it is desirable to the aforementioned plinth that the attachment section fixed to the aforementioned case for optics is formed. Thus, the space of the optical equipment circumference can be made small by preparing the attachment section to the case for optics in a plinth. Therefore, small and lightweight-ization of the optical instrument as which optical equipment is adopted can be promoted further.

[041] As for the aforementioned maintenance frame, in the optical equipment concerning the 2nd form of this invention, it is desirable to consist of a concave frame which contains the aforementioned light modulation equipment, and a support plate which carries out press fixation of the contained light modulation equipment. Maintenance fixation by which light modulation equipment was stabilized in the maintenance frame while being able to perform easily receipt and fixation of such composition, then light modulation equipment can be performed. Moreover, as for the aforementioned light modulation equipment, it is desirable to have the light-transmission nature protection-against-dust board which fixed at least to one side of the substrate of a couple and the substrate of the aforementioned couple. If such a light-transmission nature protection-against-dust board is formed when optical equipment is adopted as a projector, even if a contaminant adheres to the front face of light modulation equipment, it is possible to make it hard to be conspicuous on a projection side. Therefore, it is possible to contribute to the further improvement in quality of image.

[042] Two or more light modulation equipments with which the optical equipment concerning the 3rd form of this invention modulates two or more colored light according to image information for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment, the attachment component which has the piece of standing up formed so that the side edge of the aforementioned maintenance frame might be covered, and the piece of support which supports the field by the side of the aforementioned tone Narimitsu study element of the aforementioned maintenance frame, and is directly fixed to the flux of light incidence end face of the aforementioned tone Narimitsu study element, It has the spacer arranged between the aforementioned maintenance frame and the aforementioned piece of standing up of the aforementioned attachment component, and the aforementioned maintenance frame is characterized by being fixed to the aforementioned attachment component through the aforementioned spacer.

[043] With the optical equipment concerning the 3rd form of this invention, the flux of light incidence end face of a tone Narimitsu study element and the field of an attachment component are being fixed through the member for justification of a pin, a spacer, etc. That is, although the position of light modulation equipment is being relatively fixed, the flux of light incidence end face of a tone Narimitsu study element through the spacer, a spacer does not exist between an attachment component and the flux of light incidence end face of a tone Narimitsu study element. And the spacer is arranged between the piece of standing up of the attachment component formed so that the side edge of light modulation equipment might be covered, and the maintenance frame holding light modulation equipment. Therefore, positioning of light modulation equipment is easy, and there is also comparatively little influence a position gap of the spacer after justification affects a position gap of light modulation equipment. Therefore, it is possible to contribute to reduction of the manufacturing cost of the projector as which optical equipment, as a result this are adopted, and improvement in quality of image. In addition, direct fixed" means that these members of each other are being fixed through members for justification, such as a spacer and a pin, between each part material to "-. Therefore, it is contained in the 3rd form of this invention when silicon on sapphire and the metal plate of the sake on a heat



issipation disposition intervene among these members.

[044] As for the aforementioned maintenance frame, in the optical equipment concerning the 3rd gestalt of this invention, it is desirable to consist of a concave frame which contains the aforementioned light modulation equipment, and a support plate which carries out press fixation of the contained light modulation equipment. Maintenance fixation by which light modulation equipment was stabilized in the maintenance frame while being able to perform easily receipt and fixation of such composition, then light modulation equipment can be performed. On the other hand in the optical equipment concerning the 3rd gestalt of this invention, the supporter material which supports the optical incidence side of the aforementioned light modulation equipment constitutes the aforementioned maintenance frame, and the irradiation appearance side of the aforementioned light modulation equipment may be made to be held by the aforementioned attachment component. It becomes possible to simplify such composition, then structure, and manufacture also becomes easy. Therefore, it becomes possible to contribute to the miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost. Moreover, if the aforementioned spacer is formed between the optical injection side of the aforementioned light modulation equipment, and the field by the side of the aforementioned light modulation equipment of the aforementioned attachment component at this time, adjustment of the position of Z shaft orientations of light modulation equipment and the position of the hand of cut to the X-axis and a Y-axis will be attained.

[045] In the optical equipment concerning the 3rd gestalt of this invention, the aforementioned attachment component can be constituted by the material which has light-transmission nature. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation with the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and the optical incidence end face of a tone Narimitsu study element for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

[046] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to stiffen adhesives with metaled good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

[047] In the optical equipment concerning the 3rd gestalt of this invention, the aforementioned attachment component is heights in the plane of composition with the aforementioned tone Narimitsu study element, and it is desirable that a partial crevice is formed between the aforementioned tone Narimitsu study element and the aforementioned attachment component of the aforementioned tone Narimitsu study element and the aforementioned heights. When exchange of light modulation equipment is needed the time of such composition, then manufacture, and after manufacture, it becomes possible to remove light modulation equipment easily using the crevice formed between the aforementioned tone Narimitsu study element and the aforementioned attachment component. That is, since tools, such as a driver, can be fitted over this crevice, the work which tears off an attachment component and a tone Narimitsu study element becomes easy. Therefore, it is possible to contribute to reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and improvement in after-sale service nature. Moreover, since this crevice forms the air course for cooling optical elements, such as a polarizing plate arranged at light modulation equipment or its periphery, it becomes possible [ preventing degradation by the heat of the optical element arranged at light modulation equipment or its periphery ], and contributes to improvement in quality of image.

[048] It has the plinth fixed at least to one side in the optical equipment concerning the 3rd gestalt of this invention among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone narimitsu study element. this optical equipment It is attached in the case for optics which arranges the optic which constitutes an optical instrument through the aforementioned plinth along with a predetermined optical axis, and it is desirable to the aforementioned plinth that the attachment section fixed to the aforementioned case for optics is formed. Thus, the space of the optical equipment circumference can be made small by preparing the attachment section to the use for optics in a plinth. Therefore, small and lightweight-ization of the optical instrument as which optical equipment is adopted can be promoted.

049] As for the aforementioned light modulation equipment, in the optical equipment concerning the 3rd gestalt of this invention, it is desirable to have the light-transmission nature protection-against-dust board which fixed at least to one side of the substrate of a couple and the substrate of the aforementioned couple. If such a light-transmission nature protection-against-dust board is formed when optical equipment is adopted as a projector, even if a contaminant adheres to the front face of light modulation equipment, it is possible to make it hard to be conspicuous on a projection side. Therefore, it is possible to contribute to the further improvement in quality of image.

050] Two or more light modulation equipments with which the optical equipment concerning the 4th gestalt of this invention modulates two or more colored light according to image information for every colored light, The maintenance frame which the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment is optical equipment formed in one, holds the aforementioned light modulation equipment, and comes to have opening into the portion corresponding to the image formation field of this light modulation equipment, the plinth fixed at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, The attachment component which has the piece of standing up formed so that the side edge of the aforementioned maintenance frame might be covered, and the piece of support which supports the field by the side of the aforementioned tone Narimitsu study element of the aforementioned maintenance frame, and is directly fixed to the aforementioned plinth, It has the spacer arranged between the aforementioned maintenance frame and the aforementioned piece of standing up of the aforementioned attachment component, and the aforementioned maintenance frame is characterized by being fixed to the aforementioned attachment component through the aforementioned spacer.

051] The optical equipment concerning the 4th form of this invention has the following operation and effects.

A) Since light modulation equipment is not fixed to the flux of light incidence end face of a tone Narimitsu study element but it fixes like the conventional POP structure to the flux of light incidence end face of a tone Narimitsu study element, and the side of the plinth fixed to the crossing end face, the space which fixes light modulation equipment to the flux of light incidence end face of a tone Narimitsu study element becomes unnecessary. Therefore, the size of a tone Narimitsu study element can be made small, and, thereby, miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost can be aimed at.

3) Moreover, like before, the position of light modulation equipment is not necessarily prescribed by the flux of light incidence end face of a tone Narimitsu study element, and comes to be prescribed by the plinth side. Therefore, size of the part tone Narimitsu study element can be made small. Thereby, miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost can be aimed at. Furthermore, since the back focus of a projection lens can be shortened when this optical equipment is adopted as a projector, much light can be understood with a projection lens and it becomes possible to acquire a bright projection picture.

052] (C) Light modulation equipment is not further fixed to the flux of light incidence end face of a tone Narimitsu study element. Since it fixes to the flux of light incidence end face of a tone Narimitsu study element, and the side of the plinth fixed to the crossing end face, when exchange of light modulation equipment is needed the time of manufacture, and after manufacture, even if it removes light modulation equipment, a blemish is not attached to the flux of light incidence end face of a tone Narimitsu study element. Moreover, even if it is the case where light modulation equipment and the tone Narimitsu study element are being fixed by adhesion, after removing light modulation equipment, it is not necessary to shave off the adhesives which fixed to the flux of light incidence end face of a tone Narimitsu study element. Therefore, it is possible to contribute to reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and improvement in after-sale service nature.

D) The side of a plinth and the field of an attachment component are being fixed through the member for justification of a pin, a spacer, etc. further again. Although the position of light modulation equipment is being relatively fixed to the side of a plinth through the spacer, a spacer does not exist between an attachment component and the optical incidence end face of a tone Narimitsu study element. And the spacer is arranged between the piece of standing up of the attachment component formed so that the side edge of light modulation equipment might be covered, and the maintenance frame holding light modulation equipment. Therefore, positioning of light modulation equipment is easy, and there is also comparatively little influence a position gap of the spacer after justification affects a position gap of light modulation equipment. Therefore, it is possible to contribute to reduction of the manufacturing cost of the projector as which optical equipment, as a result this are adopted, and improvement in quality of image. In addition, "direct fixed" means that the attachment component is being fixed to the plinth side through members for justification, such as a spacer and a pin, to "plinth side. Therefore, it is contained in the 4th gestalt of this invention when silicon on sapphire and the metal plate of the sake on a thermolysis disposition intervene between the plinth side and an attachment component.

053] As for the aforementioned maintenance frame, in the optical equipment concerning the 4th form of this invention, it is desirable to consist of a concave frame which contains the aforementioned light modulation equipment, and a support plate which carries out press fixation of the contained light modulation equipment. Maintenance fixation of which light modulation equipment was stabilized in the maintenance frame while being able to perform easily receipt and fixation of such composition, then light modulation equipment can be performed. On the other hand in the optical equipment concerning the 4th form of this invention, the supporter material which supports the optical incidence side of the aforementioned light modulation equipment constitutes the aforementioned maintenance frame, and the irradiation appearance side of the aforementioned light modulation equipment may be made to be held by the aforementioned attachment component. It becomes possible to simplify such composition, then structure, and manufacture also becomes easy. Therefore, the adjustment of the position of a hand of cut [ as opposed to / if the aforementioned spacer is formed again between the optical injection side of the aforementioned light modulation equipment and the field by the side of the aforementioned light modulation equipment of the aforementioned attachment component at this time / the position of Z shaft orientations of light modulation equipment, and the X-axis and the Y-axis ] which becomes possible [ contributing to the miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and reduction of a manufacturing cost ] is attained.

054] In the optical equipment concerning the 4th form of this invention, the aforementioned attachment component can be constituted by the material which has light-transmission nature. As such a material, light-transmission nature resins, such as acrylic material, are mentioned, for example. Thus, these fixation can be easily performed by using optical hardening adhesives for fixation of the material of light-transmission nature then a maintenance frame and an attachment component and an attachment component, and a plinth for an attachment component. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted. Moreover, when an attachment component is made into products made of a resin, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, an attachment component can be easily manufactured with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component can be attained and lightweight-ization of the optical instrument as which optical equipment, as a result this are adopted can be promoted.

055] It is also possible to constitute the aforementioned attachment component with a metal on the other hand. As such a material, it is lightweight and the alloy with which thermal conductivity made the main material good aluminum, magnesium, titanium, or these is mentioned, for example. Moreover, when a metal constitutes an attachment component, it is desirable to fix a maintenance frame and an attachment component with heat-hardened type adhesives. If heat-hardened type adhesives are used, it is possible to stiffen adhesives with metal good thermal conductivity for a short time. Therefore, it becomes possible to raise optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted.

056] The aforementioned plinth can be fixed to the both sides of the end face of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element in the optical equipment concerning the 4th form of this invention. If the aforementioned attachment component of a plinth formed the crevice in a part of end face by which adhesion fixation is carried out at this time, when exchange of light modulation equipment is needed the ease of manufacture, and after manufacture, it becomes possible to remove light modulation equipment easily. That is, simple tools, such as a driver, can be fitted over the crevice formed in the plinth side, the work which tears off an attachment component and a tone Narimitsu study element becomes easy. Therefore, it is possible to contribute to the further reduction of the manufacturing cost of the optical instrument as which optical equipment, as a result this are adopted, and the further improvement in after-sale service nature. Moreover, as for the side of the aforementioned plinth, it is desirable at this time to have projected rather than the flux of light incidence end face of the aforementioned tone Narimitsu study element. When it fixes such composition, then an attachment component to the plinth side by adhesion, even if adhesives overflow a plane of composition, the adhesives which overflowed with lobes can be received. Therefore, it is possible to prevent that adhesives begin to leak to the flux of light incidence end face of a tone Narimitsu study element. Therefore, when this optical element is adopted as optical instruments, such as a projector, it is possible to contribute to the further improvement in quality of image.

057] In the optical equipment concerning the 4th form of this invention, it is possible to prepare the connection member which connects the aforementioned attachment components which fix the aforementioned plinth only to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, and counter near the aforementioned end face of another side. the case where it considers as such composition -- the aforementioned plinth, the aforementioned attachment component, and the aforementioned connection -- the further simplification of structure and shortening of a manufacturing process are attained by really considering at least two of members as fabrication Therefore, it becomes possible to contribute to the further

miniaturization of the optical instrument as which optical equipment, as a result this are adopted, and the further reduction of a manufacturing cost. In addition, if the coefficient of thermal expansion of mold goods and the tone Narimitsu study element attached there is made to really [ this ] approximate in this case, distortion by heat will be suppressed. Therefore, since it is possible to hold the position of light modulation equipment in the suitable state, a pixel gap of a projection picture can be avoided and it becomes possible to acquire a quality picture.

[0058] As for this optical equipment, in the optical equipment concerning the 4th form of this invention, it is desirable that it is attached in the case for optics which arranges the optic which constitutes an optical instrument along with a predetermined optical axis, and the attachment section fixed to the aforementioned case for optics is formed at least in one side of the aforementioned plinth. Thus, the space of the optical equipment circumference can be made small by repairing the attachment section to the case for optics in a plinth. Therefore, small and lightweight-ization of the optical instrument as which optical equipment is adopted can be promoted further.

[0059] As for the aforementioned light modulation equipment, in the optical equipment concerning the 4th form of this invention, it is desirable to have the light-transmission nature protection-against-dust board which fixed at least to one side of the substrate of a couple and the substrate of the aforementioned couple. If such a light-transmission nature protection-against-dust board is formed when optical equipment is adopted as a projector, even if a contaminant adheres to the front face of light modulation equipment, it is possible to make it hard to be conspicuous on a projection side. Therefore, it is possible to contribute to the further improvement in quality of image.

[0060] Two or more light modulation equipments with which the manufacture method of the 1st optical equipment of this invention modulates two or more colored light according to image information for every colored light, The plinth fixed process which is the manufacture method of optical equipment that the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment was unified, and fixes a plinth at least to one side among the end faces of the couple which intersects the flux of light incidence end face of the aforementioned tone Narimitsu study element, The process which equips a maintenance frame with two or more aforementioned light modulation equipments respectively, and the maintenance frame wearing process of using adhesives for an attachment component and sticking the aforementioned maintenance frame to it, The aforementioned attachment component in the attachment component wearing process of using and sticking adhesives to the aforementioned plinth side, and the state [ \*\*\*\* / un-/ the aforementioned adhesives ] Have the justification process which adjusts the position of two or more aforementioned light modulation equipments, and the adhesive setting process which stiffens the aforementioned adhesives after the aforementioned justification process, and it sets at the aforementioned justification process. When the X-axis and the Y-axis are set as biaxial [ which intersects a predetermined optical axis perpendicularly with the Z-axis and the aforementioned Z-axis ], adjustment of Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis It is characterized by being carried out between the aforementioned maintenance frame and the aforementioned attachment component, and performing adjustment of X shaft orientations, Y shaft orientations, and the hand of cut within XY side between the aforementioned attachment component and the aforementioned plinth.

[0061] Moreover, two or more light modulation equipments with which the manufacture method of the optical equipment of this invention 2nd modulates two or more colored light according to image information for every colored light, The process which is the manufacture method of optical equipment that the tone Narimitsu study element which compounds each colored light modulated with light modulation equipment was unified, and equips a maintenance frame with two or more aforementioned light modulation equipments respectively, For adhesives the maintenance frame wearing process of using adhesives for an attachment component and sticking the aforementioned maintenance frame to it, and the aforementioned attachment component, in the attachment component wearing process used and stuck and the state [ \*\*\*\* / un-/ the aforementioned adhesives ] to the flux of light incidence end face of the aforementioned tone Narimitsu study element Have the justification process which adjusts the position of two or more aforementioned light modulation equipments, and the adhesive setting process which stiffens the aforementioned adhesives after the aforementioned justification process, and it sets at the aforementioned justification process. When the X-axis and the Y-axis are set as biaxial [ which intersects a predetermined optical axis perpendicularly with the Z-axis and the aforementioned Z-axis ], adjustment of Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis It is characterized by being carried out between the aforementioned maintenance frame and the aforementioned attachment component, and performing adjustment of X shaft orientations, Y shaft orientations, and the hand of cut within XY side between the aforementioned attachment component and the flux of light incidence end face of the aforementioned color composition element.

[0062] According to the above manufacture methods, since it is decided only by physical relationship of an attachment component and a plinth through a pin or a spacer, positioning of light modulation equipment is easy for the position of shaft orientations of light modulation equipment, Y shaft orientations, and the hand of cut within XY side, and it can so reduce a position gap of the light modulation equipment after justification. Therefore, it is possible to contribute to

reduction of the manufacturing cost of the projector as which optical equipment, as a result this are adopted, and improvement in quality of image.

[063] In this manufacture method, the process which inserts the spacer which applied adhesives between the forementioned light modulation equipment and the aforementioned attachment component is established before the forementioned justification process, and adjustment of the aforementioned Z shaft orientations and the hand of cut consisting mainly of the X-axis and the Y-axis can be made to be carried out between the aforementioned maintenance frame and the aforementioned attachment component through the aforementioned spacer.

[064]

[Embodiments of the Invention] The [1st operation form] 1 operation form of this invention is hereafter explained based on a drawing.

[The main composition of a projector] The whole perspective diagram, drawing 3 , or drawing 5 as which the whole perspective diagram which looked at the projector 1 which drawing 1 requires for the 1st operation form from the upper part, and drawing 2 regarded the projector 1 from the lower part is the perspective diagram showing the interior of a projector 1. Drawing which drawing where drawing 3 removed the upper case 21 of a projector 1 from the state of drawing 1 , and drawing 4 removed the shield board 80, the driver board 90, and the up case 472 from the state of drawing 3 , and was concretely seen from the back side, and drawing 5 are drawings which removed the optical unit 4 from the state of drawing 4 . About these parts 4, 21, 80, and 90,472 that constitute a projector, it explains in full detail below.

[065] In drawing 1 or drawing 5 , a projector 1 is equipped with the sheathing case 2, the power supply unit 3 held in the sheathing case 2, and the optical unit 4 of the flat-surface U typeface similarly arranged in the sheathing case 2, and serves as a whole abbreviation rectangular parallelepiped configuration.

[066] The sheathing case 2 consists of the upper cases 21 and lower cases 23 which were made into the product made of a resin, respectively. These cases 21 and 23 of each other are being fixed with the screw. In addition, the sheathing case 2 may be not only the product made of a resin but metal. Moreover, it is also possible to make some sheathing cases into the product made of a resin, and to make other portions into metal. For example, an upper case 21 is made to the product made of a resin, and it is good also considering a lower case 23 as metal.

[067] The upper case 21 is formed in the upper surface section 211, the lateral portion 212 prepared in the circumference, the tooth-back section 213, and the transverse-plane section 214. The lamp covering 24 inserts in and it is attached in the front side of the upper surface section 211 free [ attachment and detachment ] by the formula. Moreover, in the upper surface section 211, notch 211A which the upper surface portion of the projection lens 46 proposed is prepared in the side of the lamp covering 24, and zoom operation of the projection lens 46 and focal operation can be manually performed now through a lever. The control panel 25 is formed in the back side of this notch 211A. The transverse-plane section 214 is equipped with round hole opening 212A which followed notch 211A of the aforementioned upper case 21, and the projection lens 46 is arranged corresponding to this round hole opening 212A. In this transverse-plane section 214, exhaust-port 212B formed in the lower case 23 side is located in round hole opening 212A and an opposite side. This exhaust-port 212B is located in the front side of the internal power supply unit 3. While exhausting cooling air to the direction from which it separates from a picture projection field, i.e., the left-hand side in drawing 1 , the louver 26 for exhaust air which served as the shading function is formed in exhaust-port 212B (the louver 26 for exhaust air is attached in the lower case 23 in fact).

[068] The lower case 23 is formed in the base section 231, and the lateral portion 232 and the tooth-back section 233 which were prepared in the circumference. The justification mechanism 27 in which adjust the inclination of the projector 1 whole and alignment of a projection picture is performed is formed in the front side of the base section 231. Moreover, another justification mechanism 28 in which the inclination of another direction of a projector 1 is adjusted is formed in one corner by the side of base section 231 back, and rear foot 231A is prepared in the corner of another side. However, rear foot 231A cannot adjust a position. Furthermore, inlet-port 231B of cooling air is prepared in the base section 231. Attachment section 232A for attaching free [ rotation of the handle 29 of a KO typeface ] is prepared in one lateral portion 232.

[069] Side foot 2A ( drawing 2 ) used as the leg at the time of turning a handle 29 up and standing a projector 1 to one side of such a sheathing case 2 at each lateral portion 212,232 of an upper case 21 and a lower case 23 is prepared. Moreover, interface section 2B which carried out opening ranging over the tooth-back section 213 of an upper case 21 and the tooth-back section 233 of a lower case 23 is prepared in the tooth-back side of the sheathing case 2, the interface covering 215 is formed in this interface section 2B, and the interface substrate of illustration abbreviation in which various connectors were mounted is arranged further at the interior side of the interface covering 215. moreover the right-and-left both sides of interface section 2B -- each tooth-back section 213,233 -- straddling -- a loudspeaker hole 2C and inlet-port 2D are prepared Inlet-port 2D of these is located in the back side of the internal power supply

nit 3.

070] The power supply unit 3 consists of a power supply 31 and a lamp drive circuit (ballast) 32 arranged in the side of a power supply 31, as shown in drawing 4. A power supply 31 supplies the power supplied through the power cable to the lamp drive circuit 32, the driver board 90 (drawing 3), etc., and is equipped with the inlet connector 33 (drawing 2) in which the aforementioned power cable is inserted. The lamp drive circuit 32 supplies power to the light source lamp 411 of the optical unit 4.

071] As shown in drawing 4, drawing 6, and drawing 7, the optical unit 4 is a unit which processes optically the flux of light injected from the light source lamp 411, and forms the optical image corresponding to image information, and is equipped with the integrator lighting optical system 41, the color separation optical system 42, the relay optical system 43, electro-optics equipment 44, the cross dichroic prism 45 (drawing 7) as a tone Narimitsu study system, and the projection lens 46 as projection optical system.

072] these power supply units 3 and the optical unit 4 cover the circumference including the upper and lower sides with the shield board 80 (drawing 3, drawing 5) made from aluminum -- having -- \*\*\*\* -- this -- the electromagnetism from power supply unit 3 grade to the exterior -- the leakage of a noise is prevented

073] In drawing 4 and drawing 7 (2. Detailed composition of optical system) The integrator lighting optical system 41 It is the optical system for illuminating mostly the image formation field of the liquid crystal panel 441 (it is indicated as liquid crystal panels 441R, 441G, and 441B for every colored light of red, green, and blue, respectively) of three sheets which constitutes electro-optics equipment 44 to homogeneity. Light equipment 413, It has the 1st lens array 418, the 2nd lens array 414 containing UV filter, the polarization sensing element 415, the 1st condensing lens 416, the reflective mirror 424, and the 2nd condensing lens 419.

074] Light equipment 413 has the light source lamp 411 as a source of synchrotron orbital radiation which injects the beam of light of a radial, and the reflector 412 which reflects the synchrotron orbital radiation injected from this light source lamp 411 among these. As a light source lamp 411, a halogen lamp, a metal halide lamp, or a high-pressure mercury lamp is used in many cases. The parabolic mirror is used as a reflector 412. You may use an ellipsoid mirror with an parallel-sized lens (concave lens) besides a parabolic mirror.

075] The 1st lens array 418 has the composition with which the small lens which sees from an optical axis and has a rectangle-like profile mostly was arranged in the shape of a matrix. Each smallness lens is dividing into two or more partial flux of lights the flux of light injected from the light source lamp 411. The profile configuration of each smallness lens is set up so that an analog may be mostly made with the configuration of the image formation field of a liquid crystal panel 441. For example, if the aspect ratio (ratio of the size of width and length) of the image formation field of a liquid crystal panel 441 is 4:3, it will set also to the aspect ratio 4:3 of each smallness lens.

076] The 2nd lens array 414 has the same composition as the 1st lens array 418 and abbreviation, and has the composition with which the small lens was arranged in the shape of a matrix. This 2nd lens array 414 has the function which image formation of the image of each smallness lens of the 1st lens array 418 is carried out on a liquid crystal panel 441 with the 1st condensing lens 416 and the 2nd condensing lens 419.

077] The polarization sensing element 415 is unit-ized by the 2nd lens array 414 and one while it is arranged between the 2nd lens array 414 and the 1st condensing lens 416. Such a polarization sensing element 415 changes the light from the 2nd lens array 414 into one kind of polarization light, and, thereby, the use efficiency of the light in electro-optics equipment 44 is raised.

078] Concretely, finally the 1st condensing lens 416 and the 2nd condensing lens 419 are mostly overlapped on each partial light changed into one kind of polarization light by the polarization sensing element 415 on the liquid crystal panels 441R and 441G of electro-optics equipment 44, and 441B. In the projector using the liquid crystal panel of the type which modulates polarization light, since only one kind of polarization light can be used, the simultaneously half of the light from the light source lamp 411 which emits a random polarization light cannot be used. Then, by using the polarization sensing element 415, the injection light from the light source lamp 411 is changed into about one kind of polarization light, and the use efficiency of the light in electro-optics equipment 44 is raised. In addition, such a polarization sensing element 415 is introduced to JP,8-304739,A.

079] The color separation optical system 42 is equipped with two dichroic mirrors 421,422 and the reflective mirrors 423, and has the function to divide into the colored light of three colors of red, green, and blue two or more partial flux of lights injected by dichroic mirrors 421 and 422 from the integrator lighting optical system 41.

080] The relay optical system 43 is equipped with the incidence side lens 431, a relay lens 433, and the reflective mirrors 432 and 434, and has the function to draw the colored light separated with the color separation optical system 42, and a blue glow to liquid crystal panel 441B.

081] Under the present circumstances, in the dichroic mirror 421 of the color separation optical system 42, while a part for blue Mitsunari and the green light component of the flux of light which were injected from the integrator



ghting optical system 41 penetrate, a red light component reflects. It reflects by the reflective mirror 423, and the red light reflected with the dichroic mirror 421 reaches liquid crystal panel 441R for red, after the polarization direction is arranged with a polarizing plate 442 through the field lens 417. This field lens 417 changes into the parallel flux of light each partial flux of light injected from the 2nd lens array 414 to the medial axis (chief ray). The same is said of the field lens 417 prepared in the optical incidence side of other liquid crystal panels 441G and 441B.

0082] Among the blue glows and green light which penetrated the dichroic mirror 421, green light amounts to liquid crystal panel 441G for green, after reflecting with a dichroic mirror 422 and arranging the polarization direction with a polarizing plate 442 through the field lens 417. On the other hand, a blue glow penetrates a dichroic mirror 422, passes along the relay optical system 43, arranges the polarization direction with a polarizing plate 442 through the field lens 417 further, and reaches liquid crystal panel 441B for blue glows. In addition, since the optical-path-length halfbeak of other colored light also has the long length of the optical path of a blue glow, the relay optical system 43 is used for the blue glow for preventing decline in the use efficiency of the light by diffusion of light etc. That is, it is for telling the partial flux of light which carried out incidence to the incidence side lens 431 to the field lens 417 as it is.

0083] Electro-optics equipment 44 is equipped with the liquid crystal panels 441R, 441G, and 441B as light modulation equipment of three sheets. Using the polysilicon contest TFT as a switching element, each colored light separated with the color separation optical system 42 is modulated according to image information with the polarizing plate 442 in an each liquid crystal panelR [ 441 ], 441G, and 441B, such flux of light incidence, and injection side, and liquid crystal panels 441R, 441G, and 441B form an optical image.

0084] The cross dichroic prism 45 as a tone Narimitsu study element compounds the picture which was injected from the liquid crystal panels 441R, 441G, and 441B of three sheets and which was modulated for every colored light, and forms a color picture. In addition, the dielectric multilayer which reflects red light, and the dielectric multilayer which reflects a blue glow are formed in the cross dichroic prism 45 in the shape of abbreviation for X characters in accordance with the interface of four rectangular prisms, and three colored light is compounded by these dielectric multilayers. And the color picture compounded with the cross dichroic prism 45 is injected from the projection lens 46, and expansion projection is carried out on a screen.

0085] Each optical system 41-45 explained above is held in the case 47 for optics made of the synthetic resin as a case for optics, as shown in drawing 4 and drawing 6 . Here, the up case 472 and the lower case 471 are lightweight respectively, and thermal conductivity is formed by resins, such as metals, such as good aluminum and good magnesium, and titanium, these alloys or a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin. this case 47 for optics -- the above-mentioned -- each -- it consists of a lower case 471 in which the lot which inserts in a slide formula the polarizing plate 442 arranged at the optical optic 414-419, 421-423, 431-434 and incidence side of each liquid crystal panels 441R, 441G, and 441B from the upper part was established, respectively, and an up case 472 of the shape of a lid which blockades the opening side of the upper part of the lower case 471 moreover, the head section 49 is formed in the irradiation appearance side of the case 47 for optics. The projection lens 46 is fixed to the front side of the head section 49, and the cross dichroic prism 45 with which liquid crystal panels 441R, 441G, and 441B were attached in the back side is being fixed.

0086] (3. Cooling structure) The projector 1 of this operation gestalt is equipped with the panel cooling system A which mainly cools liquid crystal panels 441R, 441G, and 441B, the lamp cooling system B which mainly cools the light source lamp 411, and the power supply cooling system C which mainly cools a power supply 31 as it was shown in drawing 2 , drawing 4 - drawing 6 .

0087] First, the panel cooling system A is explained using drawing 2 , drawing 4 , and drawing 5 . In the panel cooling system A, the sirocco fans 51 and 52 of the couple arranged at the both sides of the projection lens 46 are used. The cooling air attracted by sirocco fans 51 and 52 from inlet-port 231B at the bottom is brought near by the axial flow ventilating-fan 53 side of a front corner, cooling the inferior surface of tongue of the driver board 90 ( drawing 3 ), after turning the polarizing plate 442 ( drawing 7 ) in a liquid crystal panelR [ 441 ], 441G, and 441B, flux of light incidence [ of those ], and injection side to the upper part from a lower part and cooling, and is exhausted from exhaust-port 212B by the side of a front face ( drawing 3 ).

0088] Next, the lamp cooling system B is explained using drawing 4 or drawing 6 . In the lamp cooling system B, the sirocco fan 54 prepared in the inferior surface of tongue of the optical unit 4 is used. After the cooling air in the projector 1 which was able to be drawn near by the sirocco fan 54 enters in the case 47 for optics from opening which was prepared in the up case 472 and which is not illustrated and cools these through between the 2nd lens array 414 ( drawing 7 ) and the polarization sensing element 415 ( drawing 7 ), it comes out of exhaust side opening 471A of the lower case 471, and is attracted and breathed out by this sirocco fan 54. The breathed-out cooling air enters in the case 47 for optics again from inspired air flow path opening 471B of the lower case 471, enters in light equipment 413 ( drawing 7 ), cools the light source lamp 411 ( drawing 7 ), comes out of the case 47 for optics after this, and is



exhausted by the aforementioned axial flow ventilating fan 53 from exhaust-port 212B ( drawing 3 ).

1089] Furthermore, the power supply cooling system C is explained using drawing 4 . In the power supply cooling system C, the axial flow inhalation-of-air fan 55 prepared behind the power supply 31 is used. After the cooling air is inducted from inlet-port 2D by the side of a tooth back by the axial flow inhalation-of-air fan 55 cools a power supply 1 and the lamp drive circuit 32, it is exhausted by the axial flow ventilating fan 53 from exhaust-port 212B ( drawing 3 ) like other cooling systems A and B.

1090] (4. Structure of optical equipment) Below, it attaches and explains in full detail in the structure of optical equipment with reference to drawing 8 or drawing 14 . First, as shown in drawing 8 , optical equipment is equipped with the attachment component 446 infixed between the cross dichroic prism 45, the plinth 445 fixed to vertical both sides (end face of the couple which intersects a flux of light incidence end face) of the cross dichroic prism 45, each liquid crystal panels 441R, 441G, and 441B, the maintenance frame 443 which holds each liquid crystal panels 441R, 441G, and 441B, and the maintenance frame 443 and the plinth 445 side, and is constituted. In addition, by drawing 8 , in order to simplify drawing, a liquid crystal panel 441, the maintenance frame 443, and every one attachment component 446 each are shown. These elements 441, 443, 446 are arranged in fact at other two flux of light incidence end faces of the cross dichroic prism 45. Moreover, also in drawing 9 , drawing 15 , and drawing 16 , it is the same. Here, it is lightweight and thermal conductivity can constitute a plinth 445, an attachment component 446, and the maintenance frame 443 with metals, such as resins, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, or good aluminum, magnesium, titanium or an alloy with which these are made into the main material. Each is constituted from the Magnesium alloy by this operation gestalt. Although it is also possible to form these elements 445, 446, and 443 with a respectively separate material, since the direction made into this quality of the material becomes the same [ the amount of the dimensional change (expansion, contraction) by heat ], functional reliability is high. Moreover, when these elements expand and contract with heat, it becomes possible to also mitigate the influence affect the quality of image of a projection picture. Moreover, when the influence affect such functional reliability and the quality of image of a projection picture is taken into consideration, for the coefficient of thermal expansion of the material of these elements 445, 446, and 443, it is desirable that it is close to the coefficient of thermal expansion of the glass which constitutes the cross dichroic prism 45 as much as possible.

1091] The plinth 445 is being fixed to vertical both sides of the cross dichroic prism 45, a periphery configuration is larger than the cross dichroic prism 45 a little, and the side has projected from the side of the cross dichroic prism 45. Moreover, as shown in drawing 9 , crevice 445A is formed over the verge of the upper and lower sides which counter the side of a plinth 445, and tools, such as a driver, can be inserted now between the attachment components 446 and plinths 445 by which adhesion fixation is carried out. Furthermore, attachment section 445B for fixing optical equipment to the lower case 471 is formed in the plinth 445 fixed to the upper surface of the cross dichroic prism 45.

1092] As shown in drawing 13 , liquid crystal was enclosed between drive substrate (for example, substrate in which FT element electrically connected with electrode [ of the shape of two or more line ] and electrode which constitutes pixel among these was formed) 441A, and opposite substrate (for example, substrate in which common electrode was formed) 441E, and, as for the liquid crystal panel 441, cable 441C for control is prolonged from between these glass substrates. Light-transmission nature protection-against-dust board 441D for it not being [ the dust which shifted the position of the panel side of a liquid crystal panel 441 from the back focus position of the projection lens 46, and adhered to the panel front face optically ] conspicuous, and making it drive substrate 441A and opposite substrate 441E is fixed. As a light-transmission nature protection-against-dust board, a thermally conductive good material of phosphor, crystal, or a quartz is used. Although light-transmission nature protection-against-dust board 441D is prepared with this operation gestalt, such a protection-against-dust board is not indispensable. Moreover, you may make it prepare light-transmission nature protection-against-dust board 441D only on one substrate among drive substrate 441A and opposite substrate 441E. Furthermore, you may make it prepare a gap between light-transmission nature protection-against-dust board 441D and Substrates 441A and 441E. The same is said of the following operation gestalten. In addition, in drawings other than drawing 13 , light-transmission nature protection-against-dust board 441D is omitted.

1093] As shown in drawing 13 , the maintenance frame 443 consists of support-plate 444B which carries out pressurization of each liquid crystal panels 441R, 441G, and 441B which engaged with concave frame 444A which has the stowage 444A1 in which each liquid crystal panels 441R, 441G, and 441B are held, and concave frame 444A, and are contained. Moreover, the maintenance frame 443 grasps the periphery of light-transmission nature protection-against-dust board 441D which fixed to opposite substrate 441E of each liquid crystal panels 441R, 441G, and 441B. And each liquid crystal panels 441R, 441G, and 441B are contained by the stowage 444A1 of the maintenance frame 443. opening 443C prepare in the position corresponding to the panel side of each contained liquid crystal panels

41R, 441G, and 441B -- having -- \*\*\*\* -- moreover -- the four corners -- a hole -- 443D is formed. Moreover, as shown in drawing 9, engagement to hook 444D prepared in the right-and-left both sides of support-plate 444B and hook engagement section 444C prepared in the part where concave frame 444A corresponds performs fixation with concave frame 444A and support-plate 444B. Here, each liquid crystal panels 441R, 441G, and 441B are exposed by opening 443C of the maintenance frame 443, and this portion serves as an image formation field. That is, each colored light R, G, and B is introduced into this portion of each liquid crystal panels 441R, 441G, and 441B, and an optical image is formed according to image information. Furthermore, the shading film (illustration ellipsis) is prepared in the flux of light injection side edge side of this support-plate 443B, and it prevents reflecting further the light by the reflection from the cross dichroic prism 45 in the cross dichroic prism 45 side, and is made to prevent the fall of the contrast by the stray light.

[0094] An attachment component 446 carries out maintenance fixation of the maintenance frame 443 which holds each liquid crystal panels 441R, 441G, and 441B, and as shown in drawing 9, it is equipped with rectangle plate 446A and in 447A which protruded from the four corners of this rectangle plate 446A. Here, there is no need that the position of in 447A is the corner of rectangle plate 446A. Moreover, there should be the two or more number of pin 447A not only in four. This attachment component 446 intervenes between a plinth 445 and the maintenance frame 443.

Adhesion fixation of pin 447A of this attachment component 446 and the end face of an opposite side is carried out at the side of a plinth 445. Moreover, pin 447A of this attachment component 446 and the hole of the maintenance frame 443 -- adhesion fixation of an attachment component 446 and the maintenance frame 443 of each other is carried out through 443D. Rectangle-like opening 446B is formed in the center of abbreviation, and 446Ns of crevices are formed in this rectangle plate 446A over the vertical verge. This opening 446B corresponds with the image formation field of each liquid crystal panels 441R, 441G, and 441B at the time of wearing of each liquid crystal panels 441R, 441G, and 441B. Moreover, the shading film (illustration ellipsis) is prepared in the flux of light injection side edge side of rectangle plate 446A like the maintenance frame 443.

[0095] Moreover, engagement slot 446C is formed so that this opening 446B may be enclosed, and the polarizing plate 442 with which the polarization film used transparent adhesives and was stuck on silicon on sapphire is fixed by a double-sided tape or adhesion so that it may engage with this engagement slot 446C. The hole with which, as for pin 447A, the path of the standup section from the rectangle plate 446A was formed in the maintenance frame 443 -- it is formed greatly and a crevice is secured from 443D between each liquid crystal panels 441R, 441G, and 441B and an attachment component 446 at the time of wearing of each liquid crystal panels 441R, 441G, and 441B. The path of pin 447A when there is such no structure 447A -- the nose of cam from an end face -- applying -- abbreviation -- when are formed identically and an attachment component 446 is equipped with the maintenance frame 443, the adhesives which it becomes impossible to secure a crevice and fix the maintenance frame 443 and an attachment component 446 will spread in surface tension in maintenance frame 443 end face, and will adhere to the screen of a liquid crystal panel 441

[0096] (5. The manufacture method of optical equipment) Below, it explains in full detail about the manufacture method of optical equipment with reference to drawing 9.

1) First, use adhesives for the vertical side of the cross dichroic prism 45, and fix a plinth 445 to it (plinth fixed process).

2) Further, a polarizing plate 442 is fixed by the double-sided tape or adhesion so that it may engage with engagement slot 446C of an attachment component 446 (polarizing plate fixed process).

3) Contain each liquid crystal panels 441R, 441G, and 441B to the stowage 444A1 of concave frame 444A of the maintenance frame 443. Then, support-plate 444B of the maintenance frame 443 is attached from the liquid crystal panel insertion side of concave frame 444A, press fixation is carried out and each liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

4) The hole of the maintenance frame 443 which held each liquid crystal panels 441R, 441G, and 441B -- insert pin 447A of an attachment component 446 in 443D (maintenance frame wearing process)

[0097] (e) Stick the end face of an opposite side on the plinth 445 side (flux of light incidence end-face side of the cross dichroic prism 45) through adhesives with pin 447A of an attachment component 446 (attachment component wearing process). At this time, an attachment component 446 is stuck to the plinth side with the surface tension of adhesives.

5) Adjust the position of each liquid crystal panels 441R, 441G, and 441B in the state [ \*\*\*\* / un-/ adhesives ] (justification process).

6) Stiffen adhesives after performing positioning of each liquid crystal panels 441R, 441G, and 441B, and fix (adhesive setting process). Optical equipment is manufactured by the above process procedures. It is desirable to use

ie heat-curing adhesives which have good thermal conductivity as adhesives used by the above manufacturing process, and optical hardening adhesives. Thus, as the heat-curing adhesives which have good thermal conductivity, or optical hardening adhesives, there are adhesives of the acrylic which mixed silver palladium, or an epoxy system. Moreover, generally as optical hardening adhesives, the ultraviolet-rays hardening type adhesives hardened by radiation of ultraviolet rays are known. If optical hardening type adhesives are used when one side is formed with the metal among the members to paste [ each other ] up and one side is formed with the material of light-transmission nature in heat-curing adhesives, it will become possible to aim at shortening of production time. Also in other operation gestalten, it is the same. With this operation gestalt, since the plinth 445, the attachment component 446, and the maintenance frame 443 are constituted from a Magnesium alloy excellent in thermal conductivity, if heat-curing adhesives are used, adhesives can be hardened more in a short time, and it will become possible to aim at shortening of production time.

10098] (6. The justification method of a liquid crystal panel) Positioning of the liquid crystal panels 441R, 441G, and 441B in the justification process of the above (f) is performed as follows. first, about liquid crystal panel 441G which carry out a right pair to the projection lenses 46 (drawing 7 etc.) It is alignment adjustment (X shaft orientations), using the plane of composition of the plinth 445 side and an attachment component 446 as a sliding surface. Focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) is performed by performing adjustment of Y shaft orientations and the direction of theta, and sliding the maintenance frame 443 through the joint of the maintenance frame 443 and an attachment component 446, i.e., pin 447A. That is, alignment adjustment is in the state which fixed one position among the plinth 445 and the attachment component 446, and can be carried out by moving another side in X shaft orientations, Y shaft orientations, and the direction of theta. Moreover, focal adjustment is in the state which fixed one position among the maintenance frame 443 and the attachment component 446, and can be carried out by moving another side in Z shaft orientations, the direction of Xtheta, and the direction of Ytheta. After adjusting liquid crystal panel 441G to a position, adhesives are stiffened by the hot air, the ot beam, ultraviolet rays, etc. Next, justification and fixation of liquid crystal panels 441R and 441B are performed like the above on the basis of liquid crystal panel 441G which positioning and fixation completed. In addition, there is no need of not necessarily performing manufacture of optical equipment and positioning of a liquid crystal panel in above sequence. For example, what is necessary is to be the above-mentioned manufacturing process (d) and (e), and just to fix a plinth 445, an attachment component 446, and the maintenance frame 443 with solder, after equipping with each part material through adhesives and completing positioning of (f), when using solder as adhesives. The same is said of the optical equipment of this operation gestalt and other operation gestalten manufactured by the same manufacture method.

10099] (7. Means of attachment of optical equipment) The optical equipment which consists of the liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 which were unified by the above methods is being fixed to the attachment section 473 of the lower case 471 through attachment section 445B of the plinth 445 fixed to the upper surface (field which intersects perpendicularly to flux of light plane of incidence) of the cross dichroic prism 45, as shown in drawing 10 , drawing 11 , and drawing 14 . This attachment section 445B is equipped with four arm 445C which extended on all sides in plane view, as shown in drawing 9 . Moreover, two round hole 445D which is on the diagonal line mostly among round hole 445D prepared in each arm 445C as shown in drawing 11 or drawing 14 fits into the projected part 474 for positioning prepared in the corresponding attachment section 473, and the screw 475 screwed in the corresponding attachment section 473 is inserted in two round hole 445D which remains. Moreover, as shown in drawing 9 , grasping section 445E is prepared in the square portion of the center of attachment section 445B so that it may be easy to grasp an operator at the time of attachment and detachment.

10100] On the other hand, the attachment section 473 of the lower case 471 is formed in the upper part of the four boss sections 476 of the shape of a pillar of the lower case 471 which continued over the vertical direction mostly, and a prismatic, as shown in drawing 10 and drawing 14 . Therefore, where attachment section 445B of a plinth 445 is attached in the attachment section 473 of the lower case 471, liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 are arranged at the state where it was hung at the inferior-surface-of-tongue side of attachment section 445B, and are held in the case 47 for optics in the state where it floated slightly from the base of the lower case 471.

10101] In such a lower case 471, the head section 49 for projection lens 46 fixation is formed in the two boss sections 476 by the side of the projection lens 46 at one. This boss section 476 has the reinforcement function for making it the head section 49 not incline, even if the large projection lens 46 of a weight is fixed to the head section 49. Two or more pieces 477 (on behalf of some pieces 477 of maintenance, it illustrates to drawing 4 and drawing 10 ) of maintenance which met in the vertical direction are formed in the two boss sections 476 estranged from the projection lens 46 side, and the slot for inserting in the field lens 417, a dichroic mirror 421,422, the incidence side lens 431, and a relay lens

33 is formed between the pieces 477 of maintenance of the couple which approaches each other. That is, it is reinforced with the boss section 476 by forming these pieces 477 of maintenance in the boss section 476 and one.

[102] On the other hand, as shown in drawing 11, notch opening 472A was prepared in the portion corresponding to liquid crystal panels 441R, 441G, and 441B (drawing 8) and the cross dichroic prism 45 (drawing 8), and the attachment section 473 of the lower case 471 is also exposed to the upper case 472 from this notch opening 472A. Where the upper case 472 is attached in the lower case 471, it can be detached [that is, / the liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 which are shown in drawing 8 etc.] by being fixed to the plinth 445 beforehand equipped with attachment section 445B and attached by the plinth 445 every [attachment section 445B] to the attachment section 473.

[103] Moreover, especially the attachment section 473 prepared in the head section 49 and the boss section 476 of one is located more nearly up than medial-axis X-X of the projection lens 46 shown in drawing 12. For this reason, though two arm 445C of attachment section 445B laps from the head section 49 in plane view to the periphery of edge 46A of the projection lens 46 projected to the cross dichroic prism 45 side as shown in drawing 14, a mutual substantial interference arises.

[104] (8. Cooling structure of optical equipment) Below, it explains in full detail about the cooling structure of the optical equipment fixed to the case 47 for optics by the above-mentioned means of attachment. As shown in drawing 10 - drawing 13, inspired air flow path opening 471C is prepared in three corresponding to liquid crystal panels 441R, 441G, and 441B, and the polarizing plate 442 arranged at the liquid crystal panel R [441], 441G, and 441B and this optical incidence, and injection side by the cooling air in the panel cooling system A (drawing 2, drawing 5) which flows in the case 47 for optics from such inspired air flow path opening 471C is cooled by the base of the lower case 471. Under the present circumstances, piece of \*\* top 478A (a total of six sheets) of the couple which the straightening vane 478 of the tabular of a flat-surface abbreviation triangle was formed in the inferior surface of tongue of the lower case 471, and was prepared in the straightening vane 478 projects in an upper part side from inspired air flow path opening 471C. In addition, in drawing 11, the two-dot chain line has shown piece of \*\* top 478A. The flow of the cooling air for cooling liquid crystal panels 441R, 441G, and 441B and a polarizing plate 442 is prepared upwards from a lower part by such piece of \*\* top 478A.

[105] In drawing 11 or drawing 13 furthermore, in a round edge parallel to the flux of light plane of incidence which the cross dichroic prism 45 side among the peripheries of inspired air flow path opening 471C \*\*\*\*\* 471D which started from the base of the lower case 471 is located. And the upper-limit section is close with the soffit side of the plinth 445 fixed to the inferior surface of tongue of the cross dichroic prism 45. It is made hard to leak from the base of the lower case 471, and the crevice between the cross dichroic prisms 45, and the cooling air to the upper part [lower part] is flowed into the crevice between liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45.

[106] (9. Effect of the 1st operation gestalt) According to such this operation gestalt, there are the following effects.

(1) Pin 447A for fixing the maintenance frame 443 is prepared in the attachment component 446, and in order not to use the pin or spacer which were constituted as independent parts like the conventional POP structure, there are few part mark. Moreover, structure is simple and manufacture is also easy structure. Therefore, it becomes possible to contribute to the miniaturization of optical equipment, as a result a projector, and reduction of a manufacturing cost.

[107] (2) Since liquid crystal panels 441R, 441G, and 441B are fixed to the plinth 445 side fixed [not fixed to the flux of light incidence end face of a cross dichroic prism] to the vertical side of the cross dichroic prism 45 like the conventional POP structure, it is almost the same as the image formation field of liquid crystal panels 441R, 441G, and 441B, or the size of the flux of light incidence end face of the cross dichroic prism 45 can be held down to a little larger size than it. Therefore, the size of the cross dichroic prism 45 can be made small, and, thereby, miniaturization of optical equipment, as a result a projector and reduction of a manufacturing cost can be aimed at.

[108] (3) Moreover, like before, the position of liquid crystal panels 441R, 441G, and 441B is not necessarily specified by the position of the flux of light incidence end face of the cross dichroic prism 45, and comes to be described by the side of a plinth 445. Therefore, size of the part and the cross dichroic prism 45 can be made small. Thereby, miniaturization of optical equipment, as a result a projector and reduction of a manufacturing cost can be aimed at. Furthermore, since the back focus of the projection lens 46 can be shortened, much light can be understood with the projection lens 46, and a bright projection picture can be acquired.

[109] (4) Since liquid crystal panels 441R, 441G, and 441B are further fixed to the plinth 445 side fixed [not fixed to the flux of light incidence end face of a cross dichroic prism] to the vertical side of the cross dichroic prism 45, when change of liquid crystal panels 441R, 441G, and 441B is needed the time of manufacture, and after manufacture, even if it removes these, a blemish is not attached to the flux of light incidence end face of the cross dichroic prism 45. Moreover, there is also no need of shaving off the adhesives which fixed to the flux of light incidence end face. Therefore, it is possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a

projector and improvement in after-sale service nature.

0110] (5) Since the position of liquid crystal panels 441R, 441G, and 441B is decided only by physical relationship of an attachment component 446 and a plinth 445 through a pin or a spacer, positioning of liquid crystal panels 441R, 441G, and 441B is easy for it, and it can still also reduce a position gap of the liquid crystal panels 441R, 441G, and 441B after justification. Therefore, it is possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a projector and improvement in quality of image.

0111] (6) There is no need of establishing the mechanism in which a polarizing plate is held separately, between each liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45, by fixing the polarizing plate 442 located on each liquid crystal panels' R [ 441 ], 441G, and 441B flux of light injection side so that it may engage with engagement slot 446C of an attachment component 446. Therefore, optical equipment as a result the cost reduction of a projector, and small and lightweight-izing can be promoted. In addition, you may make it fix to this engagement slot 446C phase contrast boards (for example, 1/4 wavelength plate, 1/2 wavelength plate, etc.) and an optical compensating plate (for example, "Fuji WV Film wide view A" (tradename) etc. which Fuji Photo Film sells) with the polarizing plate 442 instead of a polarizing plate 442.

0112] (7) crevice 445A is prepared in the plinth 445 side in which adhesion fixation of the attachment component 446 is carried out -- moreover, when exchange of liquid crystal panels 441R, 441G, and 441B is needed owing to a certain fault generated the time of manufacture, and after manufacture by establishing 446 Ns of crevices in rectangle plate 446A of an attachment component 446, it becomes possible to remove these easily That is, since tools, such as a driver, can be inserted in crevice 445A or 446 Ns, a plinth 445, an attachment component 446 and an attachment component 446, and the maintenance frame 443 can be torn off easily. Therefore, it is possible to contribute to the further reduction of the manufacturing cost of optical equipment, as a result a projector and improvement in after-sale service nature.

0113] (8) The periphery configuration of a plinth 445 is larger than the periphery configuration of the cross dichroic prism 45, therefore when using heat-curing adhesives or optical hardening adhesives for the plinth 445 side for an attachment component 446 when the side of a plinth 445 has projected rather than the side of the cross dichroic prism 45, and carrying out adhesion fixation, even if adhesives overflow a plane of composition, the adhesives which overflowed with the lobe can be received. Therefore, leakage \*\*\*\* of the adhesives to the flux of light incidence end-face of the cross dichroic prism 45 can be prevented. Therefore, it is possible to contribute to the further improvement in the quality of image of a projector.

0114] (9) Since attachment section 445B for fixing to the lower case 471 the optical equipment which consists of liquid crystal panels 441R, 441G, and 441B and a cross dichroic prism 45 is formed in the plinth 445 in one, the space of the optical equipment circumference can be made small. Therefore, it is possible to promote small and lightweight-ization of a projector.

0115] (10) Moreover, since it is attached in the attachment section 473 of the boss section 476 upper part which serves as a near side of the attachment-and-detachment direction from optical equipment, when exchanging optics, attachment section 445B does not need to remove a screw 475, or does not need to insert the driver for binding tight again into the interior of the case 47 for optics. Therefore, there is no fear of damaging the field lens 417 grade held in the case 47 for optics with the driver, and exchange work is easy. Moreover, when attachment section 445B is in a near side, arm 45C of attachment section 445B which extended on all sides does not collide with the field lens 417 grade in the case 47 for optics in exchange work. Exchange work is easy also at such a point. Therefore, it is possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a projector and improvement in after-sale service nature.

0116] (11) The maintenance frame 443 is constituted by concave frame 444A which holds liquid crystal panels 441R, 441G, and 441B, and support-plate 444B which carries out press fixation of the held liquid crystal panels 441R and 441G and the 441B \*\*. Therefore, while being able to perform easily hold and fixation of liquid crystal panels 441R, 441G, and 441B, maintenance fixation by which liquid crystal panels 441R, 441G, and 441B were stabilized can be performed.

0117] (12) Moreover, since light-transmission nature protection-against-dust board 441D is prepared in liquid crystal panels 441R, 441G, and 441B, even if a contaminant adheres to the front face of liquid crystal panels 441R, 441G, and 441B, it can be made hard to be conspicuous on a projection screen. Therefore, it is possible to contribute to improvement in quality of image.

0118] (13) By preparing the shading film in the maintenance frame 443 and flux of light injection end-face side of an attachment component 446, it can prevent reflecting further the light by the reflection from the cross dichroic prism 45 on the cross dichroic prism 45 side, and the fall of the contrast by the stray light can be prevented. Therefore, it is possible to contribute to improvement in quality of image.

4) Since the plinth 445, the attachment component 446, and the maintenance frame 443 consist of these quality of the materials (Magnesium alloy) and they become the same [ the amount of dimensional changes (expansion contraction) by heat ], functional reliability is high. Moreover, when these elements expand and contract with heat, it becomes possible to also mitigate the influence affect the quality of image of a projection picture.

1119] (15) Since it is formed in the head section 49 and one, the boss section 476 by the side of the projection lens 46 to reinforce the head section 49 with the boss section 476, and even if it carries out the thinning of the part head section 49, it can prevent the fall lump by fixation of the projection lens 46. Therefore, the miniaturization of the case 7 for optics, as a result the optical unit 4 can be promoted more.

6) the piece 477 of maintenance for holding further the optic of the polarizing plate 442 grade arranged at the optical field lens 417, dichroic mirror 421,422, incidence side lens 431, relay lens 433, and incidence side of each liquid crystal panels 441R, 441G, and 441B Since it is reinforced with being prepared in the boss section 476 of the side estranged from the projection lens 46 at one, the piece 477 of maintenance and thickness around it can be made thin, and the miniaturization of the optical unit 4 can be promoted also at this point.

1120] (17) The attachment section 473 on the head section 49 and the boss section 476 of one since it is located in the both sides of the direction of a path of the projection lens 46, and it estranges from medial-axis X-X of the projection lens 46 and it is prepared up (medial-axis X-X -- the near side of the attachment-and-detachment direction) Edge 46A of the projection lens 46 which penetrated and projected arm 445C of attachment section 445B and the head section 49 cannot interfere, but the width of face and the size of the part arm 445C can be enlarged. Therefore, the support intensity of liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 can be raised.

8) Moreover, since edge 46A of the projection lens 46 projects from the head section 49 and is close with the cross dichroic prism 45, the back focus of the projection lens 46 can be shortened. Therefore, much light can be understood with the projection lens 46, and a bright projection picture can be acquired.

1121] (19) Alignment adjustment (adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) performs the plane of composition of the plinth 445 side and an attachment component 446 as a sliding surface, and is made to perform focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of theta) by sliding the maintenance frame 443 through the joint of the maintenance frame 443 and an attachment component 446, i.e., pin 447A. Therefore, since the position of liquid crystal panels 441R, 441G, and 441B is decided only by physical relationship of an attachment component 446 and a plinth 445 through a pin or a spacer, positioning of liquid crystal panels 441R, 441G, and 441B is easy, and it is possible to also reduce the position gap after justification. Therefore, it becomes possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a projector, and improvement in quality of image.

1122] The [2nd operation form] Next, the 2nd operation form of this invention is explained. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 1st operation form, and the detailed explanation is omitted or simplified. The attachment component 446 was equipped with pin 447A which protruded from the four corners of rectangle plate 446A with the optical equipment in the aforementioned 1st operation form. On the other hand, with the optical equipment in the 2nd operation form, as shown in drawing 15 , differs in that the attachment component 446 is equipped with piece of standing up 447B of the letter of the transverse-plane abbreviation for L characters. Other composition and the other manufacture method are the same as that of the 1st operation form. Concretely, this piece of standing up 447B is located in the four corners of rectangle plate 446A, it protrudes so that it may be prolonged along with the edge of this rectangle plate 446A, and it is constituted so that the periphery of the maintenance frame 443 which holds each liquid crystal panels 441R, 441G, and 441B may be held. And piece of standing up 447B and the end face of liquid crystal panels 441R, 441G, and 441B paste up with heat-curing adhesives or optical hardening adhesives. Here, there is no need that the position of piece of standing up 447B is the corner of rectangle plate 446A. Moreover, there should be the two or more number of piece of standing up 447B not only in four.

1123] According to such a 2nd operation form, piece of standing up 447B for fixing the maintenance frame 443 is prepared in the attachment component 446, and since the pin or spacer which were constituted as independent parts like the conventional POP structure are not used, the same effect as (1) stated by explanation of the 1st operation form can be acquired. Moreover, it is possible to also acquire the same effect as aforementioned (2) - (19) stated by explanation of the 1st operation form. Moreover, since piece of standing up 447B is formed in the four corners of rectangle plate 446A, it is possible to perform maintenance by which was distributed by four pieces of standing up and the influence of external force was stabilized. Moreover, since such a configuration of piece of standing up 447B can be easily manufactured by sheet metal work and golden die forming, it leads to cost reduction.

1124] The [3rd operation form] Next, the 3rd operation form of this invention is explained. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 1st operation



m, and the detailed explanation is omitted or simplified. The attachment component 446 was equipped with pin 447A which protruded from the four corners of rectangle plate 446A with the optical equipment in the aforementioned operation form. On the other hand, with the optical equipment in the 3rd operation form, as shown in drawing 16, differs in that the attachment component 446 is equipped with piece of standing up 447C of the letter of the transverse-plane abbreviation for L characters. Other composition and the other manufacture method are the same as that of the 1st operation form. Concretely, this piece of standing up 447C is located in the four corners of rectangle plate 446A, it protrudes so that it may be prolonged along with the edge of this rectangle plate 446A, and it is constituted so that the periphery of the maintenance frame 443 which holds each liquid crystal panels 441R, 441G, and 441B may be held. Moreover, this piece of standing up 447C is prepared along the side of an parallel couple mutually rectangle plate 446A ], and the side of the parallel couple of piece of standing up 447C has the same length as the side of the couple of rectangle plate 446A. And piece of standing up 447C and the end face of liquid crystal panels 441R, 441G, and 441B paste up with heat-curing adhesives or optical hardening adhesives.

[125] According to such a 3rd operation form, piece of standing up 447C for fixing the maintenance frame 443 is prepared in the attachment component 446, and since the pin or spacer which were constituted as independent parts in the conventional POP structure are not used, the same effect as (1) stated by explanation of the 1st operation form can be acquired. Moreover, it is possible to also acquire the same effect as aforementioned (2) - (19) stated by explanation of the 1st operation form. Moreover, since such a configuration of piece of standing up 447C can be easily manufactured by sheet metal work and golden die forming, it leads to cost reduction. Furthermore, since the side of the parallel couple of this piece of standing up 447C has the same length as the side of rectangle plate 446A, it can intercept the light which leaks from between an attachment component 446 and the maintenance frames 443. That is, since it can prevent that the light which leaked within optical equipment is understood by the projection lens 46, the contrast of a projection picture falls or a picture fades by this piece of standing up 447C, it becomes possible to acquire quality picture.

[126] The [4th operation form] The 4th operation form of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 1st operation form, and the detailed explanation is omitted or simplified. With the 1st operation form, the plinth 445 was fixed to optical both sides (both sides of the end face of the couple which intersects a flux of light incidence end face) of the cross dichroic prism 45, and adhesion fixation of the attachment component 446 was carried out at the plinth 445 side. Furthermore, the polarizing plate 442 was being fixed to engagement slot 446C of an attachment component 446 by the double-sided tape or adhesives. With the 4th operation form, the point that adhesion fixation of the attachment component 446 is carried out to the flux of light incidence side edge side of the cross dichroic prism 45, and the plinth 445 are formed only in one side to this among the end faces of the couple which intersects the flux of light incidence end face of the cross dichroic prism 45. Furthermore, the polarizing plate 442 is being fixed to the flux of light incidence end face of the cross dichroic prism 45 with a double-sided tape or adhesives.

[127] Concretely, the attachment component 446 is equipped with rectangle plate 446A and pin 447A which protruded from the four corners of this rectangle plate 446A as shown in drawing 17. Corresponding to the image formation field of each liquid crystal panels 441R, 441G, and 441B, rectangle-like opening 446B is formed in this rectangle plate 446A, and notching section 446L which absorbs the behavior difference between heat is formed in \*\*\*\* of the upper and lower sides of rectangle plate 446A, and \*\*\*\* of the upper and lower sides of opening 446B at it. Furthermore, back-face 446M are formed in the left right-hand-side edge so that optical compensating plates (illustration abbreviation), such as "the Fuji WV Film wide view A (tradename) etc." which Fuji Photo Film sells, can be attached. By installation of such an optical compensating plate, the birefringence produced with liquid crystal panels 441R, 441G, and 441B is compensated, by making retardation into the minimum, wide-field-of-view cornification is enabled and a high contrast ratio can be obtained.

[128] Moreover, a polarizing plate 442 fixes in the flux of light incidence end-face abbreviation center section of the cross dichroic prism 45. Moreover, with the 1st operation form, although the attachment component 446 consisted of magnesium alloys, the resin which has light-transmission nature is used in this operation form. There is acrylic material as such a light-transmission nature resin. However, this maintenance frame 443 may be formed by the other materials, for example, it is lightweight and thermal conductivity can also constitute it with metals, such as resins, such as a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, or good aluminum, magnesium, titanium or an alloy that made these the main material. The composition except having explained above is the same as that of the 1st operation form.

[129] Next, with reference to drawing 17, it explains in full detail about the manufacture method of the optical equipment concerning this operation form.

a) First, use adhesives for the upper surface of the cross dichroic prism 45, and fix a plinth 445 to it (plinth fixed



process).

130) moreover, the flux of light incidence end-face abbreviation center section of the cross dichroic prism 45 -- a polarizing plate 442 -- a double-sided tape -- or fix using adhesives (polarizing plate fixed process)

131) Further, maintenance fixation of the optical compensating plate is carried out using a double-sided tape or adhesives so that it may engage with back-face 446M of an attachment component 446.

132) Contain each liquid crystal panels 441R, 441G, and 441B to the stowage 444A1 of concave frame 444A of the maintenance frame 443. Then, support-plate 444B of the maintenance frame 443 is attached from the liquid crystal panel insertion side of concave frame 444A, press fixation is carried out and each liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

133] (d) the hole of the maintenance frame 443 which held each liquid crystal panels 441R, 441G, and 441B -- insert pin 447A of an attachment component 446 in 443D with adhesives (maintenance frame wearing process)

134) Apply adhesives to the end face of an opposite side with pin 447A of an attachment component 446, and stick the flux of light incidence end face of the above-mentioned cross dichroic prism 45 to the flux of light incidence end face of the cross dichroic prism 45 (attachment component wearing process). At this time, an attachment component 446 is stuck to the flux of light incidence end face of the cross dichroic prism 45 with the surface tension of adhesives.

135) Adjust the position of each liquid crystal panels 441R, 441G, and 441B in the state [ \*\*\*\* / un-/ adhesives ] (justification process).

136) Harden adhesives after performing positioning of each liquid crystal panels 441R, 441G, and 441B (adhesive setting process).

In addition, since the attachment component 446 is formed by the light-transmission nature resin, if optical hardening adhesives, such as ultraviolet-rays hardening type adhesives, are used with this operation form, it is possible to be able to harden adhesives more in a short time, and to aim at shortening of production time.

137] Positioning of each liquid crystal panels 441R, 441G, and 441B in the justification process of the above (f) is performed as follows. First, focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) is performed by performing alignment adjustment (adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) by making the plane of composition of the flux of light incidence end face of the cross dichroic prism 45, and an attachment component 446 into a sliding surface, and making it slide through the plane of composition of the maintenance frame 443 and an attachment component 446, i.e., pin 447A, about liquid crystal panel 441G which carry out a right pair to That is, alignment adjustment is in the state which fixed one position among the cross dichroic prism 45 and the attachment component 446, and can be carried out by moving another side of X shaft orientations, Y shaft orientations, and the direction of theta. Moreover, focal adjustment is in the state which fixed one position among the maintenance frame 443 and the attachment component 446, and can be carried out by moving another side in Z shaft orientations, the direction of Xtheta, and the direction of Ytheta.

138] After adjusting liquid crystal panel 441G to a position, adhesives are stiffened by the hot air, the hot beam, ultraviolet rays, etc. In addition, when hardening adhesives by light, such as ultraviolet rays, hardening of the adhesives of the plane of composition of the maintenance frame 443 and an attachment component 446 should just irradiate light from the pin 447A point of an attachment component 446. Moreover, it is good to perform hardening of the adhesives of the plane of composition of the flux of light incidence end face of the cross dichroic prism 45 and an attachment component 446 by irradiating light from six places of the base side (plinth 445 side, reverse side) periphery section of the cross dichroic prism 45. Next, justification and fixation of liquid crystal panels 441R and 441B are performed like the above on the basis of liquid crystal panel 441G which positioning and fixation completed.

139] According to such a 4th operation form, there are the following effects. Pin 447A for fixing the maintenance frame 443 is prepared in the attachment component 446, and since the pin or spacer which were constituted as independent parts like the conventional POP structure are not used, the same effect as (1) stated by explanation of the 1st operation form can be acquired. Moreover, alignment adjustment (adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) performs the plane of composition of the flux of light incidence end face of the cross dichroic prism 45, and an attachment component 446 as a sliding surface, and is made to perform focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) by sliding the maintenance frame 443 through the joint of the maintenance frame 443 and an attachment component 446, i.e., pin 447A. Therefore, it is possible to acquire the same effect as (19) stated by explanation of the 1st operation form.

140] Moreover, it is possible to also acquire the same effect as the above (5) and (9) - (13) and (15) - (18) which were stated by explanation of the 1st operation form. Furthermore, with this operation form, since the attachment component 446 is made into the product made of a resin, an attachment component 446 can be easily manufactured

with injection molding etc., and it leads to large cost reduction. Moreover, lightweight-ization of an attachment component 446 can be attained and it is effective in the ability to promote lightweight-ization of optical equipment, as a result a projector. Also in three examples described previously and other examples described below, it is possible to acquire the effect the product made of a resin, then same for an attachment component 446. Furthermore, with this operation form, since the attachment component 446 is formed by the material which has light-transmission nature, these fixation can be easily performed by using optical hardening adhesives for fixation with an attachment component 446 and other members. Therefore, optical equipment, as a result the manufacture efficiency of an optical instrument in which this is adopted can be raised. Also in three examples described previously and other examples described below, the material which has light-transmission nature constitutes an attachment component 446, it is possible to acquire the same effect.

[135] Furthermore, since notching section 446L for the behavior difference absorption between heat is formed in rectangle plate 446A which constitutes an attachment component 446, though stress is applied to an attachment component 446 with heat, deformation of the appearance configuration of an attachment component 446 can be eased. Therefore, a position gap of the liquid crystal panels 441R, 441G, and 441B by heat is avoided, and since holding in a suitable position is possible, a pixel gap of a projection picture can be avoided, and it becomes possible to acquire a quality picture. Also in three operation forms described previously, it is possible by forming the notching section for the behavior difference absorption between heat in rectangle plate 446A to acquire the same effect.

[136] Since the attachment component 446 is equipped with back-face 446M for fixing an optical compensating plate further again, the fixed structure for arranging an optical compensating plate between liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 becomes unnecessary. Therefore, it becomes possible to promote optical equipment as a result the cost reduction of a projector, and small and lightweight-izing. In addition, the optical element fixed to these back-face 446M is not restricted to an optical compensating plate, but you may make it fix a polarizing plate, phase contrast boards (1/4 wavelength plate, 1/2 wavelength plate, etc.), a condenser lens, etc. here. Moreover, though the attachment component 446 is formed with the resin with this operation form, if a metal etc. forms this with a comparatively high material of thermal conductivity, the heat of the optical element fixed to back-face 446M can be efficiently emitted through an attachment component 446. Therefore, it becomes possible to prevent degradation by the heat of an optical element, and it becomes possible to contribute to high definition-ization of a projector.

[137] By preparing the optical compensating plate in the irradiation appearance side of liquid crystal panels 441R, 441G, and 441B, an angle of visibility is large and becomes possible [ acquiring the high projection picture of contrast ] further again. Also in three examples described previously and other examples described below, it is possible by preparing an optical compensating plate in the irradiation appearance side of liquid crystal panels 441R, 441G, and 441B to acquire the same effect. in addition, instead of [ of the attachment component 446 of this operation form ] -- the 1- you may make it fix polarizing plate 442 grade to engagement slot 446C (to refer to drawing 9 , drawing 15 , and drawing 16 ) of an attachment component 446 using an attachment component 446 (to refer to drawing 9 , drawing 15 , and drawing 16 ) like the 3rd operation form in this case, instead of [ of the effect acquired in this operation form based on the above-mentioned attachment component 446 ] -- the 1- it is possible to acquire the effect acquired based on the attachment component 446 of the 3rd operation form on the contrary, the 1- an attachment component 446 like this operation form is used, and you may make it fix an optical compensating plate etc. to back-face 446M instead of the attachment component 446 of the 3rd operation form in this case, the 1- in the 3rd operation form, it is possible to acquire the effect acquired based on the attachment component 446 of this operation form instead of the effect acquired based on the attachment component 446 used for these optical equipments

[138] The [5th operation form] Next, the 5th operation form of this invention is explained. By the following explanation, the same sign is given to the same structure and same, same member as the 4th operation form, and the detailed explanation is omitted or simplified. With the aforementioned 4th operation form, the polarizing plate 442 used a direct double-sided tape or adhesives for the flux of light incidence end face of the cross dichroic prism 45, and as fixed to it, and back-face 446M were formed so that rectangle plate 446A of an attachment component 446 could attach an optical compensating plate in a left right-hand-side edge. On the other hand, with the 5th operation form, 2 parts of back-face 446M and 446M1 are prepared in the attachment component 446, and the point that the polarizing plate 442 and the optical compensating plate are being fixed to these back-face 446M and 446M1 is different from the 4th operation form. Other composition and the other manufacture method are the same as that of the 4th operation form.

[139] Concretely, as shown in drawing 18 , the 1st back-face 446M and 2nd back-face 446M1 are formed in a left right-hand-side edge and vertical \*\*\*\* at rectangle plate 446A of an attachment component 446, respectively. The 1st back-face 446M and 2nd back-face 446M1 is formed so that the height sizes (the direction position of the outside of a field) from rectangle plate 446A may differ mutually. Here, a polarizing plate 442 is fixed to the 1st back-face 446M

by the double-sided tape or adhesives, and the optical compensating plate 450 is similarly fixed to the 2nd back-face 446M1 by the double-sided tape or adhesives. Since the height sizes of back-face 446M and back-face 446M1 differ mutually, it is fixed without a polarizing plate 442 and the optical compensating plate 450 interfering mutually. 0140] According to such a 5th operation form, there are the following effects besides the same effect as the 4th operation form. It becomes possible to fix two kinds of optical elements in the state where it does not interfere mutually, without establishing the fixed mechanism by another member, since the attachment component 446 is equipped with back-face 446M which are two kinds from which the direction position of the outside of a field differs, and 446M1. Therefore, it becomes possible to promote further the cost reduction of a projector, and small and lightweight-izing. In addition, these back-face 446M and the optical element fixed to M1 may not be restricted to an optical compensating plate and a polarizing plate, but may be phase contrast boards (1/4 wavelength plate, 1/2 wavelength plate, etc.), a condenser lens, etc. the 1- you may make it fix an optical compensating plate etc. to back-face 446M as an attachment component 446 of the 3rd operation form using an attachment component 446 like this operation form in this case, the 1- in the 3rd operation form, it is possible to acquire the effect acquired based on the attachment component 446 of this operation form instead of the effect acquired based on the attachment component 446 used for these optical equipments

0141] The [6th operation form] Next, the 6th operation form of this invention is explained. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 1st operation form, and the detailed explanation is omitted or simplified. With the optical equipment in the aforementioned 1st operation form, the plinth 445 was fixed to vertical both sides (both sides of the end face of the couple which intersects flux of light incidence end face) of the cross dichroic prism 45, and adhesion fixation of the attachment component 446 was carried out at the plinth 445 side. Moreover, the cross dichroic prism 45 was being hung and fixed to the lower case 471 through the plinth 445 fixed to the upper surface. moreover, the hole with which the attachment component 446 and the maintenance frame 443 were formed in pin 447A prepared in the attachment component 446, and the maintenance frame 443 -- adhesion fixation was mutually carried out through 443D Furthermore, the polarizing plate 442 was being fixed to engagement slot 446C of an attachment component 446 by the double-sided tape or adhesives.

0142] On the other hand, with the 6th operation gestalt, a plinth 445 is fixed only to the inferior surface of tongue of the cross dichroic prism 45, and this cross dichroic prism 45 is being fixed to the lower case 471 through the plinth 445 fixed to the inferior surface of tongue. Moreover, direct adhesion fixation of the attachment component 446 is carried out at the flux of light incidence end face of the cross dichroic prism 45, and adhesion fixation of the maintenance frame 443 is carried out through wedge-shaped spacer 448A at this attachment component 446. Furthermore, the polarizing plate 442 is being fixed to the flux of light incidence end face of the cross dichroic prism 45 with a double-sided tape or adhesives. The other composition is the same as that of the 1st operation gestalt.

0143] Concretely, as for the perspective diagram and drawing 20 which show the installation state of the liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 which drawing 19 requires for the 6th operation gestalt, the assembly exploded view is shown. Here, liquid crystal panels 441R, 441G, and 441B are attached in the plinth 445 of the cross dichroic prism 45 by which installation fixation was carried out using the maintenance frame 443, an attachment component 446, and wedge-shaped spacer 448A.

0144] The maintenance frame 443 of fundamental composition is the same as that of what was explained with the 1st operation gestalt including the point that the shading film is prepared in the flux of light injection side edge side of support-plate 443B, although the illustrated appearance differs from the maintenance frames 443 of the 1st operation gestalt ( drawing 9 etc.) somewhat.

0145] An attachment component 446 holds the maintenance frame 443 with which receipt maintenance of the liquid crystal panels 441R, 441G, and 441B was carried out. An attachment component 446 fixes to the flux of light incidence end face of the cross dichroic prism 45. Moreover, an attachment component 446 is equipped with opening 446B in the center of abbreviation. This opening 446B corresponds with the image formation field of each liquid crystal panels 441R, 441G, and 441B at the time of wearing of each liquid crystal panels 441R, 441G, and 441B. The shading film (illustration ellipsis) is prepared in the flux of light injection side edge side of an attachment component 446 like the maintenance frame 443.

0146] Support piece 446K which support the field by the side of piece of standing up 446D formed so that the side edge of the maintenance frame 443 might be covered, and the irradiation appearance of the maintenance frame 443 are formed in the optical incidence side of an attachment component 446. Moreover, heights 446F are prepared in the right-and-left both sides of the irradiation appearance side. These heights form a partial crevice between the cross dichroic prism 45 and an attachment component 446. And this crevice forms the air course for cooling optical elements, such as a polarizing plate arranged at liquid crystal panels 441R, 441G, and 441B or the periphery of those.

0147] Moreover, when exchange of liquid crystal panels 441R, 441G, and 441B is needed the time of manufacture,

and after manufacture, it is possible by fitting tools, such as a driver, over this crevice to tear off an attachment component 446 and the cross dichroic prism 45. Plane-of-composition 446G with the cross dichroic prism 45 are repaired in the vertical edge of heights 446F. The protrusion height of piece of standing up 446D is almost equal to the thickness of the maintenance frame 443, and the height direction length of piece of standing up 446D is almost equal to the height of the maintenance frame 443. In addition, the inside interval of piece of standing up 446D is made a little larger than the width of face of the maintenance frame 443. Moreover, the path clearance for focal adjustment is repaired between the irradiation appearance side of the maintenance frame 443, and the optical incidence side of an attachment component 446. Furthermore, slant-face 446E is formed inside [ piece of standing up 446D ] the attachment component 446, and wedge-shaped spacer 448A for fixing the maintenance frame 443 and an attachment component 446 between this slant-face 446E and the maintenance frame 443 can be inserted now. Slant-face 446E is formed in the vertical edge of piece of standing up 446D on either side at the bilateral symmetry.

[148] Wedge-shaped spacer 448A is used for positioning of liquid crystal panels 441R, 441G, and 441B and fixation with the maintenance frame 443 and an attachment component 446. Here, four wedge shape spacer 448A is used. Like plinth 445, an attachment component 446, and the maintenance frame 443, it is lightweight and thermal conductivity in constitute wedge-shaped spacer 448A with metals, such as resins, such as acrylic material, a polycarbonate containing a carbon filler, polyphenylene sulfide, and a liquid crystal resin, or good aluminum and good magnesium, titanium or an alloy with which these were made into the main material. Since it is what is used for adhesion with the maintenance frame 443 and an attachment component 446, when the dimensional change by heat is taken into consideration, as for wedge-shaped spacer 448A, it is desirable to use material with near maintenance frame 443 or attachment component 446, and coefficient of thermal expansion or the material which has a coefficient of thermal expansion between the maintenance frame 443 and an attachment component 446. It is desirable to make the same especially all material of the maintenance frame 443, an attachment component 446, and spacer 448A. Moreover, as for the coefficient of thermal expansion of the material which constitutes these elements 443, 446, and 448A, it is desirable that it is close to the glass which constitutes the cross dichroic prism 45 as much as possible. A plinth 445 fits the cross dichroic prism 45 on the core, and fixes. A plinth 445 fixes with a screw thread etc. to the lower case 471 (drawing 6).

[149] Next, the 1st manufacture method of the optical equipment concerning this operation gestalt is explained.

) Fix a polarizing plate 442 to the cross dichroic prism 45 first (polarizing plate fixed process).

) Fix the cross dichroic prism 45 which fixed the polarizing plate 442 in the center section of the plinth 445 (plinth fixed process).

[150] (c) Moreover, contain liquid crystal panels 441R, 441G, and 441B to concave frame 444A of the maintenance frame 443. Then, support-plate 444B of the maintenance frame 443 is attached from the liquid crystal panel insertion side of concave frame 444A, press fixation is carried out and liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

[151] (d) Then, contain the maintenance frame 443 among piece of standing up 446D of right and left of the maintenance frame 443 which carried out receipt maintenance of the liquid crystal panels 441R, 441G, and 441B of an attachment component 446, and make support piece 446K contact (maintenance frame wearing process).

-1) Moreover, stick plane-of-composition 446G of an attachment component 446 to the flux of light incidence end face of the cross dichroic prism 45 through adhesives (attachment component wearing process). At this time, an attachment component 446 is stuck to the flux of light incidence end face of the cross dichroic prism 45 with the surface tension of adhesives.

-2) Insert wedge-shaped spacer 448A which applied adhesives between slant-face 446E and peripheral face 443E of the maintenance frame 443 which were formed in the medial surface of piece of standing up 446D (spacer wearing process). At this time, spacer 448A is stuck to slant-face 446E and peripheral face 443E of the maintenance frame 443 with the surface tension of adhesives.

) The position of liquid crystal panels 441R, 441G, and 441B is adjusted in the state [ \*\*\*\* / un-/ still / an attachment component 446, the adhesives of the plane of composition of the cross dichroic prism 45, and the adhesives applied to a wedge-shaped spacer ] (justification process).

) Harden adhesives after performing positioning of liquid crystal panels 441R, 441G, and 441B (adhesive setting process).

[152] Positioning of each liquid crystal panels 441R, 441G, and 441B to the cross dichroic prism 45 in the justification process of the above (f) is performed as follows. First, focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) is performed by performing alignment adjustment

adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) by making the plane of composition of the flux of light incidence end face of the cross dichroic prism 45, and an attachment component 446 into a sliding surface, and sliding the joint of the maintenance frame 443 and an attachment component 446 about liquid crystal panel 441G which carry out a right pair to the projection lenses 46 ( drawing 7 etc.). That is, alignment adjustment is in the state which fixed one position among the cross dichroic prism 45 and the attachment component 446, and can be carried out by moving another side in X shaft orientations, Y shaft orientations, and the direction of theta. Moreover, focal adjustment is in the state which fixed one position among the maintenance frame 443 and the attachment component 446, and can be carried out by moving another side in Z shaft orientations, the direction of Xtheta, and the direction of Ytheta. At this time, wedge spacer 448A slides in the direction of an arrow of drawing 21 in connection with the movement of the maintenance frame 443 or an attachment component 446. After adjusting liquid crystal panel 441G to a position, adhesives are stiffened by the hot air, the hot beam, ultraviolet rays, etc. Next, justification and fixation of liquid crystal panels 441R and 441B are performed like the above on the basis of liquid crystal panel 441G which positioning and fixation completed.

[153] Moreover, the optical equipment concerning this operation gestalt can also be manufactured by the 2nd following method.

(1) Fix a polarizing plate 442 to the cross dichroic prism 45 first (polarizing plate fixed process).

(2) Fix the cross dichroic prism 45 which fixed the polarizing plate 442 in the center section of the plinth 445 (plinth fixed process).

(3) Moreover, contain liquid crystal panels 441R, 441G, and 441B to concave frame 444A of the maintenance frame 443. Furthermore, support-plate 444B is attached in concave frame 444A from the irradiation appearance side of liquid crystal panels 441R, 441G, and 441B, press fixation is carried out and liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

(4-1) To the flux of light incidence end face of the cross dichroic prism 45, adhesives etc. are used and plane-of-composition 446G of an attachment component 446 are fixed (attachment component fixing process).

[154] (d) Contain the maintenance frame 443 among piece of standing up 446D of right and left of the maintenance frame 443 which carried out receipt maintenance of the liquid crystal panels 441R, 441G, and 441B of an attachment component 446, and make support piece 446K contact (maintenance frame wearing process).

(4-2) Insert wedge-shaped spacer 448A which applied adhesives between slant-face 446E and peripheral face 443E of the maintenance frame 443 which were formed in the medial surface of piece of standing up 446D (spacer wearing process). At this time, spacer 448A is stuck to slant-face 446E and peripheral face 443E of the maintenance frame 443 with the surface tension of adhesives.

(5) The position of liquid crystal panels 441R, 441G, and 441B is adjusted in the state [ \*\*\*\* / un-/ the adhesives applied to the wedge-shaped spacer / still ] (justification process).

(6) Harden adhesives after performing positioning of liquid crystal panels 441R, 441G, and 441B (adhesive setting process).

[155] Positioning of each liquid crystal panels 441R, 441G, and 441B in the justification process of the above (f) is performed as follows. First, alignment adjustment (adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) and focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of theta) are performed by sliding the joint of the maintenance frame 443 and an attachment component 446, i.e., wedge spacer 448A, in the direction of an arrow of drawing 21 about liquid crystal panel 441G which carry out a right pair to the projection lenses 46 ( drawing 7 etc.). That is, it is possible to perform alignment adjustment and focal adjustment / moving the maintenance frame 443 in X shaft orientations, Y shaft orientations, the direction of theta and Z shaft orientations, the direction of Xtheta, and the direction of Ytheta. At this time, wedge spacer 448A slides in the direction of an arrow of drawing 21 in connection with the movement of the maintenance frame 443. After adjusting liquid crystal panel 441G to a position, adhesives are stiffened by the hot air, the hot beam, ultraviolet rays, etc.

[156] Next, justification and fixation of liquid crystal panels 441R and 441B are performed like the above on the basis of liquid crystal panel 441G which positioning and fixation completed. Concerning fixation with the maintenance frame 443 and attachment component 446 in the two above-mentioned kinds of manufacture methods, spot-temporary fixation is first performed to the adhesives around spacer 448A, after that, the crevice between slant-face 446E and peripheral face 443E of the maintenance frame 443 is filled up with adhesives, and actual fixation can be carried out. If such a fixed method is adopted, it is a short time and it is possible to fix the maintenance frame 443 and an attachment component 446 firmly. Moreover, since the crevice between slant-face 446E and peripheral face 443E of the maintenance frame 443 is filled up with adhesives, it can prevent applying thermal stress etc. and the position of spacer

48A shifting after justification, and the position of liquid crystal panels 441R, 441G, and 441B is maintained by the fixable state.

[157] In addition, it is not necessary to necessarily perform installation to the cross dichroic prism 45 of each liquid crystal panels 441R, 441G, and 441B in above sequence. For example, what is necessary is to be the above-mentioned manufacturing process (d) (e (e(e-1)-1')-2), and just to fix the cross dichroic prism 45, an attachment component 446, spacer 448A, and the maintenance frame 443 with solder, after equipping with each part material through adhesives and completing positioning of (f), when using solder as adhesives. The same is said of the optical equipment of this operation form and other operation forms manufactured by the same manufacture method. A bottom uses the liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 which were unified as mentioned above plinth 45, and they fix with a screw thread etc. to the lower case 471 ( drawing 6 ).

[158] According to such a 6th operation form, there are the following effects.

(10) The flux of light incidence end face of the cross dichroic prism 45 and the field of an attachment component 446 are being fixed through the member for justification of a pin, a spacer, etc. That is, although the position of liquid crystal panels 441R, 441G, and 441B is being relatively fixed to the flux of light incidence end face of the cross dichroic prism 45 through spacer 448A, a spacer does not exist between an attachment component 446 and the flux of light incidence end face of the cross dichroic prism 45. And the spacer is arranged between piece of standing up 446D of the attachment component 446 formed so that the side edge of liquid crystal panels 441R, 441G, and 441B might be covered, and the maintenance frame 443 holding liquid crystal panels 441R, 441G, and 441B. Therefore, positioning of liquid crystal panels 441R, 441G, and 441B is easy, and there is also comparatively little influence a position gap of spacer 448A after justification affects a position gap of liquid crystal panels 441R, 441G, and 441B. Therefore, it is possible to contribute to reduction of the manufacturing cost of the projector as which optical equipment, as a result is are adopted, and improvement in quality of image.

[159] According to the 1st manufacture method of the optical equipment concerning the 6th operation form, (21) moreover, alignment adjustment (adjustment of X shaft orientations, Y shaft orientations, and the direction of theta) the plane of composition of the flux of light incidence end face of the cross dichroic prism 45 and an attachment component 446 is performed as a sliding surface, and it is made to perform focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) by sliding the joint of the maintenance frame 443 and attachment component 446. Therefore, it is possible to acquire the same effect as (19) stated by explanation of the 5th operation form.

(2) Moreover, it is possible to also acquire the same effect as aforementioned (11) - (14) stated by explanation of the 5th operation form.

[160] (23) moreover, the case where exchange of liquid crystal panels 441R, 441G, and 441B is needed the time of manufacture, and after manufacture by the attachment component's 446 equipping the plane of composition with the cross dichroic prism 45 with heights 446F, and forming the partial crevice among these with these heights and the cross dichroic prism 45 -- this crevice -- tools, such as a driver, -- putting -- \*\*\*\*\* -- it is possible to tear off easily an attachment component 446 and the cross dichroic prism 45 by things Therefore, it becomes possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a projector, and improvement in after-sale service nature. Moreover, since this crevice forms the air course for cooling optical elements, such as a polarizing plate arranged at liquid crystal panels 441R, 441G, and 441B or the periphery of those, it becomes possible [ preventing degradation by the heat of the optical element arranged at liquid crystal panels 441R, 441G, and 441B or the periphery of those ], and contributes to improvement in quality of image.

[161] (24) Moreover, piece of standing up 446D of an attachment component 446 is formed so that the side edge of a maintenance frame may be covered. Therefore, the light which leaks from between the maintenance frame 443 and each liquid crystal panels 441R, 441G, and 441B can be intercepted. Therefore, the light which leaked from between attachment component 446 and the maintenance frames 443 can be intercepted. that is, since it can prevent that come out and the light without optical equipment which leaked is understood by the projection lens 46, the contrast of projection picture falls or a picture fades by this piece of standing up 446D, it becomes possible to acquire a quality picture

[162] In this operation form, the composition which fixes the maintenance frame 443 and an attachment component 446 is also possible, without using spacer 448A. In this case, what is necessary is just to fix an attachment component 446 and the maintenance frame 443 with adhesives etc., after preparing the crevice in which the both sides of the crevice in which focal adjustment is possible, or focal adjustment and alignment adjustment of piece of standing up 446D of an attachment component 446 and the peripheral face of the maintenance frame 443 are possible, making it confront each other and adjusting the position of liquid crystal panels 441R, 441G, and 441G. Moreover, when it fixes the maintenance frame 443 and an attachment component 446, after fixing the maintenance frame 443 and an



attachment component 446 with adhesives etc., without using spacer 448A, face to face is made to stand against the flux of light incidence end face of the cross dichroic prism 45. As for adhesives, it is good to apply, before adjusting the position of liquid crystal panels 441R, 441G, and 441B, and to perform positioning in the state [ \*\*\*\* / un-/ adhesives ]. Moreover, adhesives are applied after adjustment and you may make it stiffen them. thus, if the maintenance frame 443 and an attachment component 446 are fixed without using spacer 448A, it is possible to also acquire the effect of (1), (5), and this appearance stated with the 1st operation form in addition to the same effect as above-mentioned (20) - (24)

1163] The [7th operation form] The 7th operation form of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 6th operation form, and the detailed explanation is omitted or simplified. With the optical equipment in the aforementioned 6th operation form, wedge shape spacer of each of two right and left 448A was performing installation to the attachment component 446 of the maintenance frame 443. On the other hand, with the optical equipment in the 7th operation form, as shown in drawing 22 or drawing 23, wedge shape spacer of each one right and left 448B is performing installation to the attachment component 446 of the maintenance frame 443. Specifically, wedge-shaped spacer 448B is arranged covering the overall length of slant-face 446E of piece of standing up 446D, and the joint with the maintenance frame 443 and an attachment component 446 is formed in a vertical edge. Other composition and the other manufacture method are the same as that of the 6th operation form.

1164] According to such a 7th operation form, it is possible to acquire the same effect as the 6th operation form. Moreover, since the maintenance frame 443 and the attachment component 446 are fixed by spacer 448B of the necessary minimum number, there are few part mark and they become possible [ aiming at reduction of the manufacturing cost of optical equipment, as a result a projector ].

1165] The [8th operation form] The 8th operation form of this invention is explained below. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 6th operation form, and the detailed explanation is omitted or simplified. With the aforementioned 6th operation form and the aforementioned 7th operation form, two or more wedge-shaped spacers 448A and 448B were performing fixation in the attachment component 446 of the maintenance frame 443. on the other hand, the hole formed in pin 447A which projected in the four corners of the field by the side of the maintenance frame 443 of an attachment component 446, and the four corners of the maintenance frame 443 like the 4th operation form or the 5th operation form with the 8th operation form as shown in drawing 24 or drawing 25 -- the point which was made to perform by 443D is different. The other composition is the same as that of the 6th operation form. In addition, there is no need that the position of pin 447A is the corner of an attachment component 446. Moreover, there should be the two or more number of pin 447A not only in four. The manufacture method of the optical equipment concerning this operation form is the same as that of what was explained with the 4th operation form except for the point that the process of (b-2) does not exist.

1166] According to such an 8th operation form, there are the following effects. Pin 447A for fixing the maintenance frame 443 is prepared in the attachment component 446, and since the pin or spacer which were constituted as independent parts like the conventional POP structure are not used, the same effect as (1) stated with the 1st operation form can be acquired. Moreover, alignment adjustment (X shaft orientations, Y shaft orientations, Z shaft orientations) performs the plane of composition of the flux of light incidence end face of the cross dichroic prism 45, and an attachment component 446 as a sliding surface, and is made to perform focal adjustment (adjustment of Z shaft orientations, the direction of Xtheta, and the direction of Ytheta) by sliding the maintenance frame 443 through the joint of the maintenance frame 443 and an attachment component 446, i.e., pin 447A. Therefore, it is possible to acquire the same effect as (19) stated with the 1st operation form. moreover, what the same effect as the above (5) stated with the 1st operation form and the same effect as aforementioned (22) - (24) stated with the 6th operation form are also acquired for is possible

1167] The [9th operation form] The 9th operation form of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 7th operation form, and the detailed explanation is omitted or simplified. The maintenance frame 443 holding each liquid crystal panels 441R, 441G, and 441B was constituted from an aforementioned 1st operation form - an aforementioned 8th operation form by concave frame 444A which contains liquid crystal panels 441R, 441G, and 441B, and support-plate 444B which carries out press fixation of the contained liquid crystal panels 441R, 441G, and 441B. On the other hand, the concave frame which supports the optical incidence side of each liquid crystal panels 441R, 441G, and 441B constitutes maintenance frame 443F from the 9th operation form. And receipt maintenance is carried out directly except space 446H of an attachment component 446, without carrying out press fixation of the irradiation appearance side by support-plate 444B. Other composition is the same as that of the 7th operation form.

1168] Moreover, the light modulation equipment maintenance process of (c) of the manufacture method of the optical



equipment concerning this operation form is the same as the 6th operation form previously explained to maintenance frame 443F constituted with a concave frame except for the point ended only by containing liquid crystal panels 441R, 441G, and 441B.

[169] According to such a 9th operation form, there are the following effects. By considering maintenance frame 443F as composition without support-plate 444B, the hook engagement section for fixing support-plate 444B becomes unnecessary, and can form in a simple configuration using a plate thinner than concave frame 444A. Therefore, simplification of part mark and reduction of the number of erectors can be aimed at, and reduction of the manufacturing cost of optical equipment, as a result a projector is attained. Moreover, the effect of the above (12) stated by explanation of the same effect as the above (20) stated by explanation of the 6th operation form, (21), (23), and (24), the effect based on the number of spacer 448A stated by explanation of the 7th operation form, and the 1st operation form, (14), and this appearance can also be acquired. In this operation form, the composition which fixes the maintenance frame 443 and an attachment component 446 is also possible, without using spacer 448A. In this case, what is necessary is just to fix an attachment component 446 and the maintenance frame 443 with adhesives etc., after repairing the crevice in which the both sides of the crevice in which focal adjustment is possible, or focal adjustment and alignment adjustment of piece of standing up 446D of an attachment component 446 and the peripheral face of maintenance frame 443F are possible, making it confront each other and adjusting the position of liquid crystal panels 441R, 441G, and 441B. As for adhesives, it is good to apply, before adjusting the position of liquid crystal panels 441R, 441G, and 441B, and to perform positioning in the state [ \*\*\*\* / un-/ adhesives ]. Moreover, adhesives are applied after adjustment and you may make it stiffen them. Thus, if maintenance frame 443F and an attachment component 446 are fixed without using spacer 448A, it is possible to also acquire the same effect as (1) stated with the 1st operation form and (5) in addition to the above-mentioned effect.

[170] The [10th operation gestalt] Next, the 10th operation gestalt of this invention is explained. In the following explanation, the same sign is given to the same structure as the aforementioned 6th operation gestalt, and the same member, and the detailed explanation is omitted or simplified. The maintenance frame 443 holding each liquid crystal panels 441R, 441G, and 441B was constituted from an aforementioned 1st operation gestalt - an aforementioned stavus operation gestalt by concave frame 444A which contains liquid crystal panels 441R, 441G, and 441B, and support-plate 444B which carries out press fixation of the contained liquid crystal panels 441R, 441G, and 441B. On the other hand, as shown in drawing 28 or drawing 29, the support plate which supports the optical incidence side of each liquid crystal panels 441R, 441G, and 441B constitutes maintenance frame 443G from the 10th operation gestalt.

[171] And receipt maintenance of the liquid crystal panels 441R, 441G, and 441B is carried out receipt space 446H of an attachment component 446, and press fixation of the optical incidence side of the liquid crystal panels 441R, 441G, and 441B is carried out by maintenance frame 443G constituted by the support plate. Maintenance frame 443G constituted by the support plate and an attachment component 446 are fixed by engagement to hook 444D prepared in maintenance frame 443G, and hook engagement section 446I prepared in the attachment component 446. Furthermore, though slant-face 446E which inserts spacer 448A inside piece of standing up 446D was formed in the attachment component 446 in the 6th operation form (refer to drawing 20), the attachment component 446 of this operation form does not have such slant-face 446E. Instead, breakthrough 446J exposed to the left and right laterals of an attachment component 446 are prepared in piece of standing up 446D of an attachment component 446. Spacer 448A is inserted from the outside of an attachment component 446 through these breakthrough 446J between the optical injection side of liquid crystal panels 441R, 441G, and 441B, and the liquid crystal panels 441R and 441G of an attachment component 446 and the field by the side of 441B. Although spacer 448A and three breakthrough 446J are prepared, they may be two or four or more. Other composition is the same as that of the 6th operation form.

[172] Manufacture of the optical equipment concerning this operation form is performed as follows.

- ) Fix a polarizing plate 442 to the flux of light incidence end face of the cross dichroic prism 45 (polarizing plate fixing process).
- ) Fix the cross dichroic prism 45 which the polarizing plate 442 fixed in the center section of the plinth 445 (plinth fixing process).
- ) Fix plane-of-composition 446G of an attachment component 446 to the flux of light incidence end face of the cross dichroic prism 45 (attachment component fixing process).
- ) Hold liquid crystal panels 441R, 441G, and 441B in receipt space 446H of an attachment component 446 (light modulation equipment maintenance process).
- ) Attach maintenance frame 443G constituted by the support plate from the optical incidence side of liquid crystal panels 441R, 441G, and 441B, make hook 444D engage with hook engagement section 444C of an attachment component 446, and carry out press fixation of the liquid crystal panels 441R, 441G, and 441B (maintenance frame bearing process).

) Insert wedge-shaped spacer 448A which applied adhesives to breakthrough 446J prepared in the left and right laterals of an attachment component 446, make it move, contacting the both sides of the optical injection side of the liquid crystal panels 441R and 441G of an attachment component 446, and the field by the side of 441B and liquid crystal panels 441R, 441G, and 441B, and adjust the position of liquid crystal panels 441R, 441G, and 441B (justification process).

g) Stiffen adhesives after that (adhesive setting process).

[173] According to such a 10th operation form, there are the following effects. The flux of light incidence end face of the cross dichroic prism 45 and the field of an attachment component 446 are being fixed through the member for justification of a pin, a spacer, etc. That is, although the position of liquid crystal panels 441R, 441G, and 441B is being relatively fixed to the flux of light incidence end face of the cross dichroic prism 45 through spacer 448A, a spacer does not exist between an attachment component 446 and the flux of light incidence end face of the cross dichroic prism 45. And spacer 448A is inserted from the outside of an attachment component 446 through breakthrough 446J prepared in piece of standing up 446D of an attachment component 446 between the optical injection side of liquid crystal panels 441R, 441G, and 441B, and the liquid crystal panels 441R and 441G of an attachment component 446 and the field by the side of 441B. Therefore, the same effect as the above (20) explained with the 6th operation form can be acquired.

[174] Moreover, since only a support plate constitutes maintenance frame 443G, direct receipt maintenance of the liquid crystal panels 441R, 441G, and 441B is carried out receipt space 446H of an attachment component 446 and less fixation of the optical incidence side of the liquid crystal panels 441R, 441G, and 441B is carried out by maintenance frame 443G, curtailment of part mark and reduction of the number of erectors can be aimed at. Therefore, reduction of the manufacturing cost of optical equipment, as a result a projector is attained. moreover, the same effect as the effect of the above (23) explained with the 6th operation form and (24), the above (12) which it reached and was explained with the 1st operation form, and (14) can also be acquired.

[175] The [11th operation form] The 11th operation form of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 8th operation form, and the detailed explanation is omitted or simplified. With the 8th operation form, the attachment component 446 is fixed to the flux of light incidence end face of the direct cross dichroic prism 45. On the other hand, the sapphire board 451 with comparatively high thermal conductivity is fixed to the flux of light incidence end face of the cross dichroic prism 45, and it is made to fix an attachment component 446 through the sapphire board with the 11th operation form to the flux of light incidence end face of the cross dichroic prism 45. Specifically, as shown in drawing 30 or drawing 31, a double-sided tape or adhesives is used all over the simultaneously of the flux of light incidence end face of the cross dichroic prism 45, the sapphire board 451 is fixed, a double-sided tape or adhesives is used for the liquid crystal panel side corresponding point of the sapphire board 451 center section, and the polarizing plate 442 is stuck. Moreover, heights 446F of an attachment component 446 are fixed to the sapphire board 451 with adhesives.

[176] Furthermore, as shown in drawing 32, the crevice between the sapphire board 451 and a plinth 445 was filled up with the adhesives 449 which have good thermal conductivity, and it has combined with it possible [thermal induction of these]. The composition except having explained above is the same as that of the 8th operation form. Moreover, after the manufacture method of the optical equipment concerning this operation form uses a double-sided tape or adhesives and fixes the sapphire board 451 to the flux of light incidence end face of the cross dichroic prism 45, is the same as that of the 8th operation form except for the point which uses a double-sided tape or adhesives for the sapphire board 451, and fixes a polarizing plate 442 to it, and the point which fixes an attachment component 446 through the sapphire board 451 to the flux of light incidence end face of the cross dichroic prism 45. It is desirable to use the heat-curing adhesives which have good thermal conductivity which was described previously as adhesives on which the interface a dichroic prism 45, the sapphire board 451, an attachment component 446, and between plinth 445 pasted up, and optical hardening adhesives. in addition, the thermally conductive sheet with which carbon was mixed instead of being filled up with the adhesives which consider as the composition combined possible [thermal induction of a plinth 445 and the sapphire board 451], and have thermal conductivity among these and the spacer which consists of heat conductive guide members -- you may make it make the sapphire board 451 fix directly to the lower case 471 through a member etc. the thermally conductive sheet in this case, and a spacer -- the adhesives which have heat conduction in fixing of a member -- in addition, mechanical fixing using the screw thread etc. can also be used.

[177] According to such an 11th operation gestalt, there are the following effects besides the same effect as the aforementioned octavus operation gestalt. It adds to cooling using the air course between the cross dichroic prism 45 and liquid crystal panels 441R, 441G, and 441B. Since liquid crystal panels 441R, 441G, and 441B and the heat near a polarizing plate can be made to be able to conduct in order of pin 447A of the maintenance frame 443 - an attachment

component 446 an attachment component 446 the sapphire board 451 a plinth 445 - the lower case 471 and heat can be radiated, Even if prism 45 is [ BK7 grade ] low glass [ of thermal conductivity ] comparatively, it will become possible to raise greatly the cooling performance of liquid crystal panels 441R, 441G, and 441B and a polarizing plate 442. It is possible to maintain by this, the quality of image which could suppress degradation of a liquid crystal panel and was stabilized, although high brightness-ization of a projector progresses. In addition, the composition which fixes to the flux of light incidence end face of the cross dichroic prism 45, and is combined possible [ thermal conduction of a sapphire board and a plinth ] can apply an attachment component 446 also to the 4th - the 10th operation gestalt through a sapphire board like this operation gestalt. If it does in this way, it will also set in the 4th - the 10th operation gestalt, and it will become possible to acquire the effect of maintenance of the picture which degradation-suppressed improvement in a cooling performance and / of the liquid crystal panel ], and was stabilized.

[178] The [12th operation form] The 12th operation form of this invention is explained below. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 6th operation form, and the detailed explanation is omitted or simplified. With the aforementioned 6th operation form, the attachment component 446 had fixed to the flux of light incidence end face of the cross dichroic prism 45. To this, with the 12th operation form, as shown in drawing 33 or drawing 34, the attachment component 446 is being fixed to the plinth 445. furthermore, the upper-limit section of the attachment component 446 which counters -- frame connection -- it is connected by the member 452 The other composition is the same as that of the 6th operation form.

[179] The manufacture method of the optical equipment concerning this operation form is as follows.

) Fix a polarizing plate 442 to the flux of light incidence end face of the cross dichroic prism 45 (polarizing plate fixed process).

) Fix the cross dichroic prism 45 which the polarizing plate 442 fixed in the upper surface center section of the plinth 445 (plinth fixed process).

) Moreover, contain liquid crystal panels 441R, 441G, and 441B to concave frame 444A of the maintenance frame 443. Furthermore, support-plate 444B is attached in concave frame 444A from the irradiation appearance side of liquid crystal panels 441R, 441G, and 441B, press fixation is carried out and liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

[180] (e-1") To the end face of the methods of three of a plinth 445, adhesives etc. are used and plane-of-composition 446G of an attachment component 446 are fixed again (attachment component fixed process).

-1) further -- between the attachment components 446 by the side of synthetic irradiation appearance -- frame connection -- a member 452 is fixed (connection a member fixed process) this frame connection -- a member 452 can be used as an installation accessory plate of the projection lens 46

[181] (d-2) Then, contain the maintenance frame 443 which carried out receipt maintenance of the liquid crystal panels 441R, 441G, and 441B among piece of standing up 446D of right and left of an attachment component 446, and make it contact support piece 446K (maintenance frame wearing process).

-2) Insert wedge-shaped spacer 448A which applied adhesives between slant-face 446E and peripheral face 443E of the maintenance frame 443 which were formed in the inside side of piece of standing up 446D (spacer wearing process). At this time, spacer 448A is stuck to slant-face 446E and peripheral face 443E of the maintenance frame 443 with the surface tension of adhesives.

) The position of liquid crystal panels 441R, 441G, and 441B is adjusted in the state [ \*\*\*\* / un-/ the adhesives applied to the wedge-shaped spacer / still ] (justification process).

) Harden adhesives after performing positioning of liquid crystal panels 441R, 441G, and 441B (adhesive setting process).

[182] in addition -- the above -- a plinth 445, an attachment component 446, and connection -- although the composition and the manufacture method at the time of fixing them and unifying were explained when a member 452 was constituted as another parts and optical equipment was assembled, as shown in drawing 35, you may use the forming unit 460 which really fabricated these In this case, the manufacture method of the optical equipment which can be set is as follows.

) Fix a polarizing plate 442 to the flux of light incidence end face of the cross dichroic prism 45 (polarizing plate fixed process).

) After that, the cross dichroic prism 45 which the polarizing plate 442 fixed is inserted from the upper part of the forming unit 460, and it fixes in the upper surface center section of the plinth 445 (forming unit fixed process).

[183] (c) Moreover, contain liquid crystal panels 441R, 441G, and 441B to concave frame 444A of the maintenance frame 443. Furthermore, support-plate 444B is attached in concave frame 444A from the irradiation appearance side of

liquid crystal panels 441R, 441G, and 441B, press fixation is carried out and liquid crystal panels 441R, 441G, and 441B are held. In addition, installation of support-plate 444B to concave frame 444A can perform hook 444D of support-plate 444B by engaging with hook engagement section 444C of concave frame 444A (light modulation equipment maintenance process).

l-2) Then, contain the maintenance frame 443 which carried out receipt maintenance of the liquid crystal panels 441R, 441G, and 441B among piece of standing up 446D of right and left of an attachment component 446, and make contact support piece 446K (maintenance frame wearing process).

m-2) Insert wedge-shaped spacer 448A which applied adhesives between slant-face 446E and peripheral face 443E of the maintenance frame 443 which were formed in the medial surface of piece of standing up 446D (spacer wearing process). At this time, spacer 448A is stuck to slant-face 446E and peripheral face 443E of the maintenance frame 443 with the surface tension of adhesives.

n) The position of liquid crystal panels 441R, 441G, and 441B is adjusted in the state [ \*\*\*\* / un- / the adhesives applied to the wedge-shaped spacer / still ] (justification process).

o) Harden adhesives after performing positioning of liquid crystal panels 441R, 441G, and 441B (adhesive setting process).

l184] thus, a plinth 445, an attachment component 446, and connection -- by adopting the forming unit 460 in which the member 452 was really fabricated, part mark decrease and it becomes possible to attain simplification of structure. Moreover, an attachment component fixed process and connection -- a member -- since a fixed process can be skipped, becomes possible to assemble optical equipment easily. Therefore, it is possible to contribute to reduction of the manufacturing cost of optical equipment, as a result a projector. In addition, a plinth 445, an attachment component 446, and connection -- even if it is the case where there is no need of really fabricating all the members 452, and only two are really fabricated among these, it is possible to acquire the same effect. The method of positioning of each liquid crystal panels [ in / the justification process of (f) / about the two above-mentioned manufacture methods ] 441R, 441G, and 441B is the same as that of the process (f) explained by the 2nd manufacture method of the optical equipment concerning the 6th example.

l185] Moreover, concerning fixation with the maintenance frame 443 and an attachment component 446, spot-temporary fixation is first performed to the adhesives around spacer 448A, after that, the crevice between slant-face 446E and peripheral face 443E of the maintenance frame 443 is filled up with adhesives, and actual fixation can be carried out. If such a fixed method is adopted, it is a short time and it is possible to fix the maintenance frame 443 and attachment component 446 firmly. Moreover, since the gap between slant-face 446E and peripheral face 443E of the maintenance frame 443 is filled up with adhesives, it can prevent applying thermal stress etc. and the position of spacer 448A shifting after justification, and the position of liquid crystal panels 441R, 441G, and 441B is maintained by the suitable state.

l186] In addition, it is not necessary to necessarily perform installation to the cross dichroic prism 45 of each liquid crystal panels 441R, 441G, and 441B in above sequence. For example, -- adhesives -- \*\*\*\*\* -- solder -- using -- a case of the above -- a manufacturing process (d-1) -- (-- d -- two --) -- (-- e -- one -- " --) -- (-- e -- two --) -- adhesives -- minding -- without -- each part -- material -- equipping -- (-- f -- ' --) -- positioning -- having ended -- after an attachment component -- 446 -- a spacer -- 448 -- A -- maintenance -- a frame moreover, adhesives -- replacing with -- an attachment component 446 and frame connection -- you may make it fix a member 452 mechanically with a screw thread etc. The same is said of the optical equipment of this operation gestalt and other operation gestalten manufactured by the same manufacture method. A pars basilaris ossis occipitalis uses the liquid crystal panels 441R, 441G, and 441B and the cross dichroic prism 45 which were unified as mentioned above plinth 445, and they fix with a screw thread etc. to the lower case 471 ( drawing 6 ).

l187] According to such a 12th operation gestalt, there are the following effects.

5) It is made to fix liquid crystal panels 441R, 441G, and 441B to the plinth 445 side fixed [ not fixed to the flux of light incidence end face of the cross dichroic prism 45 ] to the vertical side of the cross dichroic prism 45 like the conventional POP structure. Therefore, it is possible to acquire the same effect as above-mentioned (2) - (4) stated in the explanation portion of the 1st operation gestalt.

6) The flux of light incidence end face of the cross dichroic prism 45 and the field with an attachment component 446 are being fixed through the member for justification of a pin, a spacer, etc. That is, although the position of liquid crystal panels 441R, 441G, and 441B is being relatively fixed to the side of a plinth 445 through spacer 448A, a spacer does not exist between an attachment component 446 and a plinth 445. And the spacer is arranged between piece of standing up 446D of the attachment component 446 formed so that the side edge of liquid crystal panels 441R, 441G, and 441B might be covered, and the maintenance frame 443 holding liquid crystal panels 441R, 441G, and 441B. Therefore, the same effect as the above (20) stated in the explanation portion of the 6th operation gestalt can be

quired.

[188] (27) When exchange of liquid crystal panels 441R, 441G, and 441B is needed the time of manufacture, and after manufacture by the attachment component's 446 equipping the plane of composition with a plinth 445 with heights 446F, and forming the partial gap between this heights and plinth 445, the thing which perform easily an attachment component 446 and the cross dichroic prism 45 and to tear off is possible by fitting tools, such as a driver, over this crevice. Therefore, it is possible to acquire the same effect as the above (23) stated by explanation of the 6th operation gestalt.

[189] Moreover, the same effect as the above (22) stated by explanation of the 6th operation gestalt and (24) can also be acquired.

[190] -- further -- the upper-limit section of an attachment component 446 -- frame connection -- while being able to carry out maintenance fixation of the attachment component 446 stably by connecting by the member 452, the temperature distribution of an attachment component 446 can be equalized and heat transfer nature can be raised

[189] The [13th operation gestalt] The 13th operation gestalt of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 12th operation gestalt, and the detailed explanation is omitted or simplified. The optical equipment in the aforementioned 12th operation gestalt was performing installation to the attachment component 446 of the maintenance frame 443 by wedge shape spacer of each of two right and left 448A. On the other hand, with the optical equipment in the 13th operation gestalt, as shown in drawing 36 or drawing 37, wedge shape spacer of each one right and left 448B is performing installation to the attachment component 446 of the maintenance frame 443. Specifically, wedge-shaped spacer 448B is ranged covering the overall length of slant-face 446E of piece of standing up 446D, and the joint with the maintenance frame 443 and an attachment component 446 is formed in a vertical edge. In addition, this operation gestalt is shown in drawing 38 -- as -- a plinth 445, an attachment component 446, and connection -- it is possible to use a member 452 or the forming unit 470 which really fabricated any two among these The manufacture method is the same as that of the 12th operation gestalt in the composition row except having explained above.

[190] According to such a 13th operation gestalt, it is possible to acquire the same effect as the 12th operation gestalt. Moreover, since the maintenance frame 443 and the attachment component 446 are fixed by spacer 448B of the necessary minimum number, there are few part mark and they become possible [ aiming at reduction of the manufacturing cost of optical equipment, as a result a projector ].

[191] The [14th operation gestalt] The 14th operation gestalt of this invention is explained below. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 12th operation gestalt, and the detailed explanation is omitted or simplified. With the aforementioned 12th operation gestalt and the aforementioned 13th operation gestalt, two or more wedge-shaped spacers 448A and 448B were performing fixation in the attachment component 446 of the maintenance frame 443. On the other hand, the hole formed in pin 447A which projected in the four corners of the field by the side of the maintenance frame 443 of an attachment component 446, and the four corners of the maintenance frame 443 with the 14th operation gestalt as shown in drawing 39 or drawing 40 -- the point which was made to perform using 443D is different The other composition is the same as that of the 12th operation gestalt. Here, there is no need that the position of pin 447A is the corner of an attachment component 446. Moreover, there should be the two or more number of pin 447A not only in four. In addition, this operation gestalt is shown in drawing 41 -- as -- a plinth 445, an attachment component 446, and connection -- it is possible to use a member 452 or the forming unit 470 which really fabricated any two among these Although the optical equipment concerning this operation gestalt is the same as that of the manufacture method of the optical equipment concerning the 12th operation gestalt almost In the point which inserts pin 447A of an attachment component 446 in 443D with the spacers, a point without the spacer wearing process of (e-2), and the justification process of (f) the maintenance frame wearing process of (d-2) -- setting -- the hole of the maintenance frame 443 -- The points performed when positioning of liquid crystal panels 441R, 441G, and 441B slides the maintenance frame 443 through a joint with an attachment component 446, i.e., pin 447A, differ.

[192] According to such a 14th operation gestalt, pin 447A for fixing the maintenance frame 443 is prepared in the attachment component 446, and like the conventional POP structure, since it does not have by carrying out the pin and spacer which were constituted as independent parts, the same effect as the above (1) stated by explanation of the 1st operation gestalt can be acquired. Moreover, it is possible to also acquire the effect of the above (27) stated by explanation of the same effect as the aforementioned (2) - (5) and (11) - stated by explanation of the 1st operation gestalt (14) and the 12th operation gestalt, (29), and this appearance

[193] The [15th operation gestalt] The 15th operation gestalt of this invention is explained below. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 13th operation gestalt, and the detailed explanation is omitted or simplified. The maintenance frame 443 holding each liquid crystal

panels 441R, 441G, and 441B was constituted from an aforementioned 12th operation gestalt - an aforementioned 14th operation gestalt by support-plate 444B which carries out press fixation of the liquid crystal panels 441R, 441G, and 441B contained in concave frame 444A which contains liquid crystal panels 441R, 441G, and 441B. On the other hand, as shown in drawing 42 and 43, the concave frame which supports the optical incidence side of each liquid crystal panels 441R, 441G, and 441B for maintenance frame 443F constitutes from the 15th operation gestalt. And receipt maintenance is carried out directly receipt space 446H of an attachment component 446, without carrying out press fixation of the irradiation appearance side by support-plate 444B. In addition, this operation gestalt is shown in drawing 38 -- as -- a plinth 445, an attachment component 446, and connection -- it is possible to use a member 452 or the forming unit 470 which really fabricated any two among these. The other composition is the same as that of the 13th operation gestalt. Moreover, the light modulation equipment maintenance process of (c) of the manufacture method of the optical equipment concerning this operation gestalt is the same as the 13th operation gestalt previously explained to maintenance frame 443F constituted with a concave frame except for the point ended only by containing liquid crystal panels 441R, 441G, and 441B.

[194] According to such a 15th operation gestalt, there are the following effects. By considering maintenance frame 443F as composition without support-plate 444B, the hook engagement section for fixing support-plate 444B becomes unnecessary, and can make it a simple configuration using a plate thinner than concave frame 444A. Therefore, simplification of part mark and reduction of the number of assemblers can be aimed at, and reduction of the manufacturing cost of optical equipment, as a result a projector is attained. Moreover, it is possible to also acquire the effect of the above (12) stated with the same effect as above-mentioned (25) - (27) stated by explanation of the 12th operation gestalt and (29), the effect based on the number of spacer 448B stated by explanation of the 13th operation gestalt, and the 1st operation gestalt, (14), and this appearance.

[195] In this operation gestalt, the composition which fixes the maintenance frame 443 and an attachment component 446 is also possible, without using spacer 448B. In this case, what is necessary is just to fix an attachment component 446 and the maintenance frame 443 with adhesives etc., after preparing the crevice in which the both sides of the crevice in which focal adjustment is possible or focal adjustment, and alignment adjustment of piece of standing up 446D of an attachment component 446 and the peripheral face of maintenance frame 443F are possible, making it confront each other and adjusting the position of liquid crystal panels 441R, 441G, and 441B. As for adhesives, it is good to apply, before adjusting the position of liquid crystal panels 441R, 441G, and 441B, and for adhesives to perform positioning by non-hardened \*\*\*\*\*. Moreover, adhesives are applied after adjustment and you may make it stiffen them. Thus, if maintenance frame 443F and an attachment component 446 are fixed without using spacer 448B, it is possible to also acquire the same effect as (1) stated with the 1st operation gestalt and (5) in addition to the above-mentioned effect.

[196] The [16th operation gestalt] The 16th operation gestalt of this invention is explained below. In the following explanation, the same sign is given to the same structure and same, same member as the aforementioned 12th operation gestalt, and the detailed explanation is omitted or simplified. The maintenance frame 443 holding each liquid crystal panels 441R, 441G, and 441B was constituted from an aforementioned 12th operation gestalt - an aforementioned 14th operation gestalt by concave frame 444A which contains liquid crystal panels 441R, 441G, and 441B, and support-plate 444B which carries out press fixation of the contained liquid crystal panels 441R, 441G, and 441B.

[197] On the other hand, as shown in drawing 44 or drawing 45, the support plate which supports the optical incidence side of each liquid crystal panels 441R, 441G, and 441B constitutes maintenance frame 443G from the 16th operation gestalt. And receipt maintenance of the liquid crystal panels 441R, 441G, and 441B is carried out receipt space 446H of an attachment component 446, and press fixation of the incidence side of the liquid crystal panels 441R, 441G, and 441B is carried out by maintenance frame 443G constituted by the support plate. Maintenance frame 443G constituted by the support plate and an attachment component 446 are fixed by engagement to hook 444D prepared in maintenance frame 443G, and hook engagement section 446I prepared in the attachment component 446. Furthermore, though slant-face 446E which inserts spacer 448A inside piece of standing up 446D was formed in the attachment component 446 in the 12th operation gestalt (refer to drawing 34), the attachment component 446 of this operation gestalt does not have such slant-face 446E. Instead, breakthrough 446J exposed to the left and right laterals of an attachment component 446 are prepared in piece of standing up 446D of the attachment component 446 of this operation gestalt. Spacer 448A is inserted from the outside of an attachment component 446 through these breakthrough 446J between the fields by the side of 441R and 441G which the optical injection side of liquid crystal panels 441R, 441G, and 441B and an attachment component 446 liquid-crystal P become, and 441B. Although spacer 448A and three breakthrough 446J are prepared, they may be two or four or more. Other composition is the same as that of the 12th operation gestalt.

[198] Manufacture of the optical equipment concerning this operation gestalt is performed as follows.



i) Fix a polarizing plate 442 first to the flux of light incidence end face of the cross dichroic prism 45 (polarizing plate fixed process).

j) Fix the cross dichroic prism 45 which the polarizing plate 442 fixed in the upper surface center section of the plinth 45 (plinth fixed process).

k) Moreover, fix plane-of-composition 446G of attachment component 446 \*\* to the end face of the methods of three of a plinth 445 (attachment component fixing process).

l-1) further -- between the attachment components 446 by the side of synthetic irradiation appearance -- frame connection -- a member 452 is fixed (connection a member fixed process)

l199] (d-2) Moreover, hold liquid crystal panels 441R, 441G, and 441B in receipt space 446H of an attachment component 446 (light modulation equipment maintenance process).

m) Attach maintenance frame 443G constituted by the support plate from the optical incidence side of liquid crystal panels 441R, 441G, and 441B, make hook 444D engage with hook engagement section 444C of an attachment component 446, and carry out press fixation of the liquid crystal panels 441R, 441G, and 441B (maintenance frame bearing process).

n) Insert wedge-shaped spacer 448A in breakthrough 446J prepared in right-and-left both sides of an attachment component 446, make it move, contacting the both sides of the optical injection side of the liquid crystal panels 441R and 441G of an attachment component 446, and the field by the side of 441B and liquid crystal panels 441R, 441G, and 441B, and adjust the position of liquid crystal panels 441R, 441G, and 441B (justification process).

o) Stiffen adhesives after that (adhesive setting process). in addition, adhesives -- replacing with -- an attachment component 446 and frame connection -- you may make it fix a member 452 mechanically with a screw thread etc.

l200] According to such a 16th operation gestalt, there are the following effects. The plinth 445 and the field of an attachment component 446 are being fixed through the member for justification of a pin, a spacer, etc. That is, although the position of liquid crystal panels 441R, 441G, and 441B is being relatively fixed to the plinth 445 through spacer 448A, a spacer does not exist between an attachment component 446 and a plinth 445. And spacer 448A is inserted from the outside of an attachment component 446 through breakthrough 446J prepared in piece of standing up 446D of an attachment component 446 between the optical injection side of liquid crystal panels 441R, 441G, and 441B, and the liquid crystal panels 441R and 441G of an attachment component 446 and the field by the side of 441B. Therefore, the same effect as the above (34) explained with the 12th operation gestalt can be acquired. Moreover, since only a support plate constitutes maintenance frame 443G, direct receipt maintenance of the liquid crystal panels 441R, 441G, and 441B is carried out in the receipt space of an attachment component 446 and press fixation of the optical incidence side of the liquid crystal panels 441R, 441G, and 441B is carried out by maintenance frame 443G, curtailment of part mark and reduction of the number of erectors can be aimed at. Therefore, reduction of the manufacturing cost of optical equipment, as a result a projector is attained. moreover, it is possible to also acquire the effect of the above (12) explained with the same effect as the above (25) explained with the 12th operation gestalt, (27), and (29) and the 1st operation gestalt, (14), and this appearance

l201] The [17th operation gestalt] The 17th operation gestalt of this invention is explained below. By the following explanation, the same sign is given to the same structure and same, same member as the 12th operation gestalt, and the detailed explanation is omitted or simplified. With the 12th operation gestalt, the attachment component 446 was fixed to the flux of light incidence end face of the direct cross dichroic prism 45. The sapphire board 451 with comparatively high thermal conductivity is fixed to the flux of light incidence end face of the cross dichroic prism 45, and it is made to fix an attachment component 446 to the side of a plinth 445 through the sapphire board 451 with the 17th operation gestalt to this. Specifically, as shown in drawing 46 and drawing 47 , a double-sided tape or adhesives is used, the sapphire board 451 is fixed, a double-sided tape or adhesives is used for the liquid crystal panel side corresponding to the sapphire board 451 center section, and the polarizing plate 442 is stuck on the front face of a simultaneously of the flux of light incidence end face of the cross dichroic prism 45. Moreover, heights 446F of an attachment component 446 are fixed to the sapphire board 451 with adhesives. Furthermore, as shown in drawing 47 , the crevice between the sapphire board 451 and a plinth 445 was filled up with the adhesives 449 which have good thermal conductivity, and it has combined with it possible [ thermal conduction of these ]. The composition except explaining explained above is the same as that of the 12th operation gestalt. Moreover, after the manufacture method of the optical equipment concerning this operation gestalt uses a double-sided tape or adhesives and fixes the sapphire board 451 to the flux of light incidence end face of the cross dichroic prism 45, it is the same as that of the 12th operation gestalt except for the point which uses a double-sided tape or adhesives and fixes a polarizing plate 442 to the sapphire board 451, and the point which fixes an attachment component 446 to the side of a plinth 445 through the sapphire board 451. It is desirable to use the heat-curing adhesives which have good thermal conductivity which was described previously as a plinth 445, the sapphire board 451, and adhesives on which the interface between attachment

component 446 is pasted up, and optical hardening adhesives.

[202] in addition, the thermally conductive sheet with which carbon was mixed instead of being filled up with the adhesives which consider as the composition combined possible [ thermal conduction of a plinth 445 and the sapphire board 451 ], and have thermal conductivity among these and the spacer which consists of heat conductive guide members -- you may make it make the sapphire board 451 fix directly to the lower case 471 through a member etc. the thermally conductive sheet in this case, and a spacer -- the adhesives which have thermal conductivity in fixing of a member -- in addition, mechanical fixing using the screw thread etc. can also be used Moreover, in case the sapphire board 451 is formed smaller than the size between heights 446F in which it was prepared by the right-and-left edge of an attachment component 446 and an attachment component 446 is fixed on the plinth 445 side, you may make it the sapphire board 451 located between the heights of an attachment component 446, although illustration is omitted.

[203] According to such a 17th operation gestalt, there are the following effects besides the same effect as the aforementioned 12th operation gestalt. It adds to cooling using the air course between the cross dichroic prism 45 and liquid crystal panels 441R, 441G, and 441B. Since the heat of liquid crystal panels 441R, 441G, and 441B or a polarizing plate 442 can be made to be able to conduct in order of the sapphire board 451 a plinth 445 - the lower case 471 and heat can be radiated, Even if prism 45 is [ BK7 grade ] low glass [ of thermal conductivity ] comparatively, it will become possible to raise greatly the cooling performance of liquid crystal panels 441R, 441G, and 441B and a polarizing plate 442. It is possible to maintain by this, the quality of image which could suppress degradation of a liquid crystal panel and was stabilized, although high brightness-ization of a projector progresses. In addition, the composition using the sapphire board 451 is applicable also to the 1st - the 3rd operation gestalt, and the 12th - the 16th operation gestalt like this operation gestalt. If it does in this way, it will also set in the 1st - the 3rd operation gestalt, and the 12th - the 16th operation gestalt, and it will become possible to acquire the effect of maintenance of the picture which degradation-suppressed [ improvement in a cooling performance and / of the liquid crystal panel ], and was stabilized.

[204] [Other operation gestalten] Although the gestalt of various operations of this invention has been explained above, this invention is not limited to the aforementioned operation gestalt, and includes other composition which can attain the purpose of this invention. For example, deformation as shown below etc. is included in this invention. for example, pin 447A on which the attachment component 446 protruded from rectangle plate 446A with the 1st, 4, 5, 8, 11, and 14 operation gestalt -- having -- \*\*\*\* -- this pin 447A -- abbreviation -- although it had pillar-shaped structure, nose-of-cam side is better than a end face also as a narrow configuration For example, as shown in drawing 48 , it is good also as structure of the approximate circle drill configuration which applies at a nose of cam from a end face, and serves as a taper. Thus, it enables a nose-of-cam side to efficiently and certainly fix a narrow configuration, then an attachment component 446 and the maintenance frame 443 with optical hardening adhesives, such as the ultraviolet-rays effect adhesives, rather than a end face for a short time in pin 447A. It is because light is enough irradiated by the adhesives which reduce the reflection and absorption of light in a pin 447A point, and exist in the joint of pin 447A and the maintenance frame 443 in case light is irradiated and is stiffened from a pin 447A point. Such structure is desirable especially when the attachment component 446 consists of metals.

[205] Moreover, you may make it a taper configuration as shows the configuration of the angle of the plinth 445 in the 1-3rd operation gestalt to drawing 49 . The plan of the plinth 445 which made the angle the taper configuration is shown in drawing 49 (A), and the B-B line cross section of drawing 49 (A) is shown in drawing 49 (B). By making a plinth 445 into such a configuration, it becomes possible to efficiently and certainly fix an attachment component 446 and the maintenance frame 443 with optical hardening adhesives, such as the ultraviolet-rays effect adhesives, for a short time. It is because light is enough irradiated by the adhesives which reduce the reflection and absorption of light at the angle of a plinth 445, and exist in the crevice between this plinth 445 and an attachment component 446 in case light is irradiated from the upper part of a plinth 445 in the crevice between this plinth 445 and an attachment component 446, in order to perform junction to a plinth 445 and an attachment component 446. In addition, what is necessary is here, just to let the edge of the plinth 445 fixed to this lower part be the thing of a taper configuration, when light is irradiated from the lower part of the plinth 445 fixed under the cross dichroic prism 45, although the case where light was irradiated from the plinth 445 upper part was explained. Moreover, the composition which makes the angle of a plinth 445 a taper configuration in this way can be applied also to the 12-17th operation gestalt.

[206] moreover -- although the attachment component 446 and the maintenance frame 443 were being fixed in the 1st, 4, 5, 8 and 11, and 14 operation gestalten through pin 447A and piece of standing up 447B of the transverse-plane abbreviation configuration for L characters -- the configuration of pin 447A or piece of standing up 447B -- drawing 8 it is not restricted to a configuration as shown in 9, 15, and 16 grades That is, as long as the configuration of pin 447A or piece of standing up 447B is a configuration which can fix an attachment component 446 and the maintenance frame 443, it may be what thing. Moreover, it is not restricted to drawing 9 and a configuration as shown in 15 and 16 about

ie configuration of engagement slot 446C prepared in the attachment component 446 of the 1-3rd operation gestalt. That is, you may be what thing as long as it is the configuration which can support a polarizing plate 442.

[207] Furthermore, it is not restricted to the composition shown in the above-mentioned operation gestalt about how the position of a plinth 445, and the plinth 445 and the lower case 471 to attach. although the plinth 445 was formed in vertical both sides (both sides of the end face of the couple which intersects a flux of light incidence end face) of the cross dichroic prism 45 for example, with the 1-3rd operation gestalt -- the 12-17th operation gestalt -- like -- a plinth 445 and connection -- you may change into a member 452 and the used composition on the contrary, the plinth 445 and connection of the 12-17th operation gestalt -- you may change a member 452 and the used composition into the composition which formed the plinth 445 in vertical both sides of prism 45 like the 1-3rd operation gestalt

[208] Moreover, although optical equipment was being fixed to the lower case 471 with the 1-4th operation gestalt by the plinth 445 fixed to the upper surface of prism 45, you may make it fixed to the lower case 471 like other operation gestalten by the plinth fixed to the inferior surface of tongue of prism 45. Moreover, although attachment section 445B of the lower case 471 of optical equipment was prepared in the plinth 445 fixed to the upper surface of the cross dichroic prism 45 with the 1-4th operation gestalt, you may make it form this in the plinth 445 fixed to the inferior surface of tongue of the cross dichroic prism 45. However, there is an advantage that it tends to detach and attach optical equipment to the lower case 471 that attachment section 445B was formed in the plinth 445 fixed to the upper surface of the cross dichroic prism 45 like an operation gestalt. Moreover, you may make it fix the optical equipment of the 5-17th operation gestalt to the lower case 471 by the plinth 445 fixed to the upper surface of prism 45 like the optical equipment of the 1-4th operation gestalt.

[209] Furthermore, in the 1-4th operation gestalt, although optical equipment was being fixed to the attachment section 473 prepared on the boss section 476 of the lower case 471, the structure of attaching optical equipment is not restricted to this. That is, the position, the configuration, etc. where the installation section of optical equipment is prepared are arbitrary. Moreover, the configuration of attachment section 445B prepared in the plinth 445 is also arbitrary, and it is not limited to the configuration of each operation gestalt where it explained previously. In addition, though the head section 49 and the piece 477 of maintenance were formed in the boss section 476 of the lower case 471 at one, you may prepare each individually.

[210] Although the partial crevice was not formed between the cross dichroic prism 45 and the attachment component 446 with the 4th operation gestalt, you may make it form a partial crevice between the cross dichroic prism 45 and an attachment component 446 like the 6-17th operation gestalt. It becomes possible to acquire such composition, then an effect as shown in (23) stated with the 6th operation gestalt.

[211] Moreover, in the 12-16th operation gestalt, you may fill up with thermally conductive adhesives the crevice formed between the cross dichroic prism 45 and the attachment component 446. In this case, since the heat-conduction path of an attachment component 446 the cross dichroic prism 45 - a plinth 445 is also formed, cooling of liquid crystal panels 441R, 441G, and 441B is promoted more.

[212] In the above-mentioned operation gestalt, although the cross dichroic prism 45 was constituted by the prism which consists of material, such as optical glass, crystal, and sapphire, and the dielectric multilayer, the composition of prism 45 is not restricted to this. For example, it is good also as composition which has arranged the cross mirror and filled up the inside of this container with the liquid in the container of the abbreviation rectangular parallelepiped formed with glass etc., or a cube. That is, as long as prism 45 is equipped with the function which compounds colored light, and the flux of light incidence end face for attaching light modulation equipment, it may be what composition. Furthermore, although only the example of the projector which used three light modulation equipments was given with each aforementioned operation gestalt, this invention is applicable also to the projector which used only one light modulation equipment, the projector using two light modulation equipments, or the projector using four or more light modulation equipments.

[213] Moreover, with each aforementioned operation gestalt, although the liquid crystal panel was used as light modulation equipment, the device using the micro mirror etc. may use light modulation equipments other than liquid crystal. Furthermore, although the penetrated type light modulation equipment with which optical plane of incidence differs from an optical injection side was used with the aforementioned operation gestalt, you may use the reflected type light modulation equipment with which optical plane of incidence and an optical injection side become the same.

[214] With before each \*\*\*\*\* gestalt, although only the example of the front type projector which performs projection was given from the direction which observes a screen, this invention can be applied also to the rear type projector which performs projection from an opposite side with the direction which observes a screen further again.

## NOTICES \*

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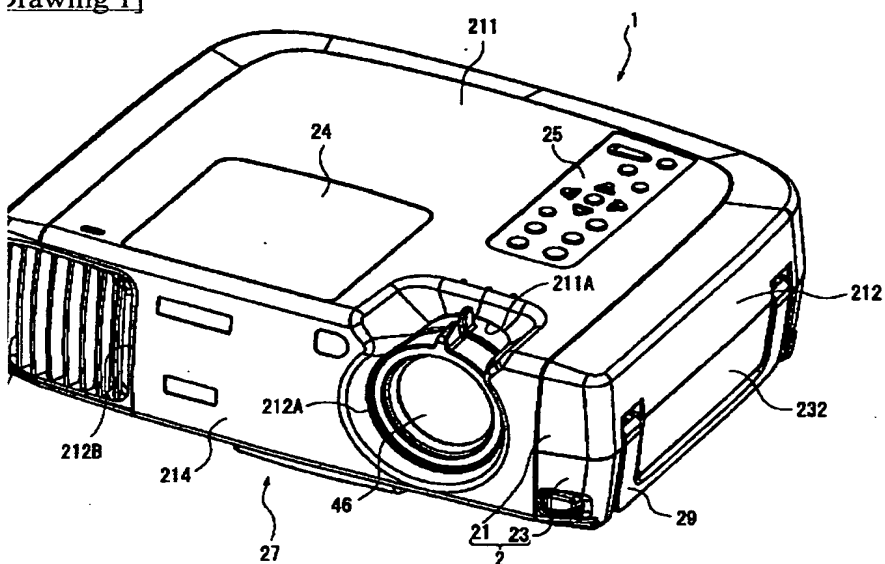
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\*\*\*\* shows the word which can not be translated.

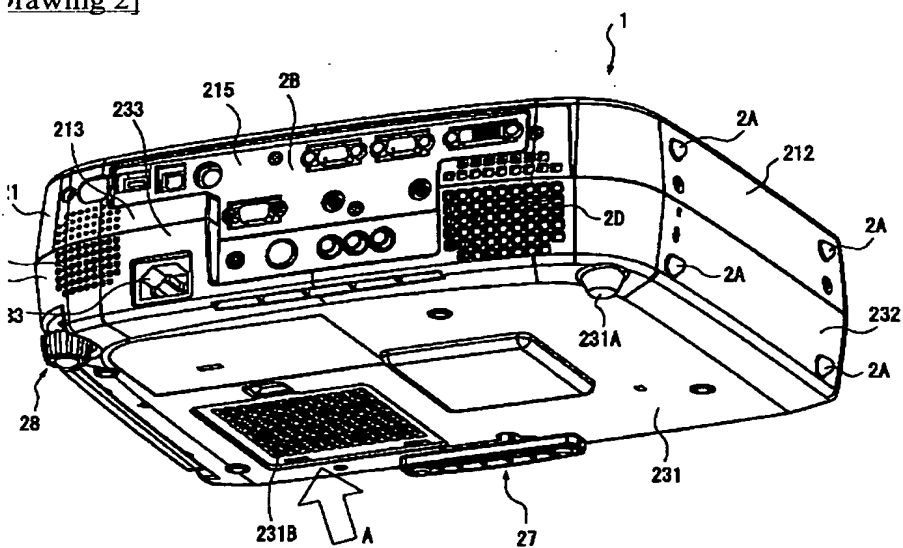
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## DRAWINGS

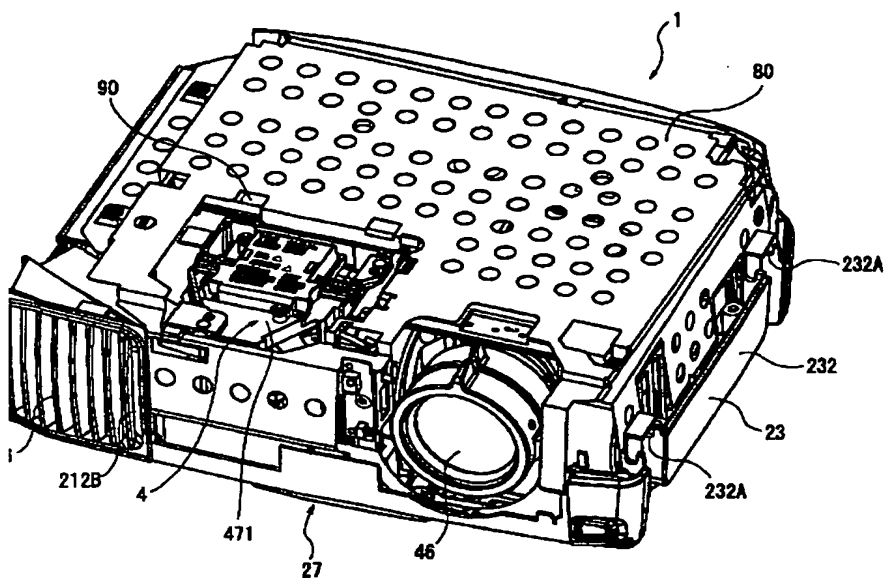
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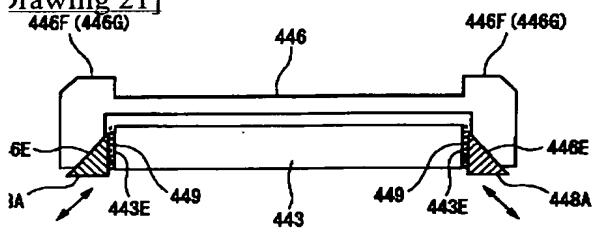
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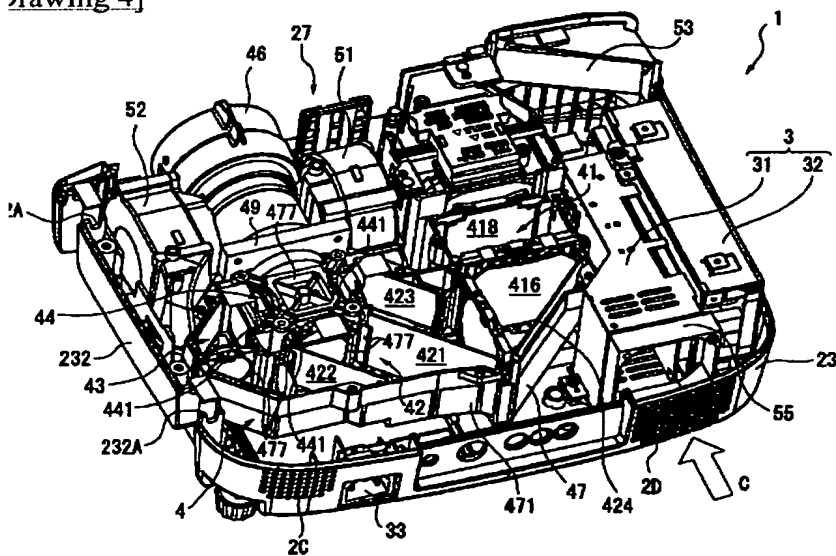
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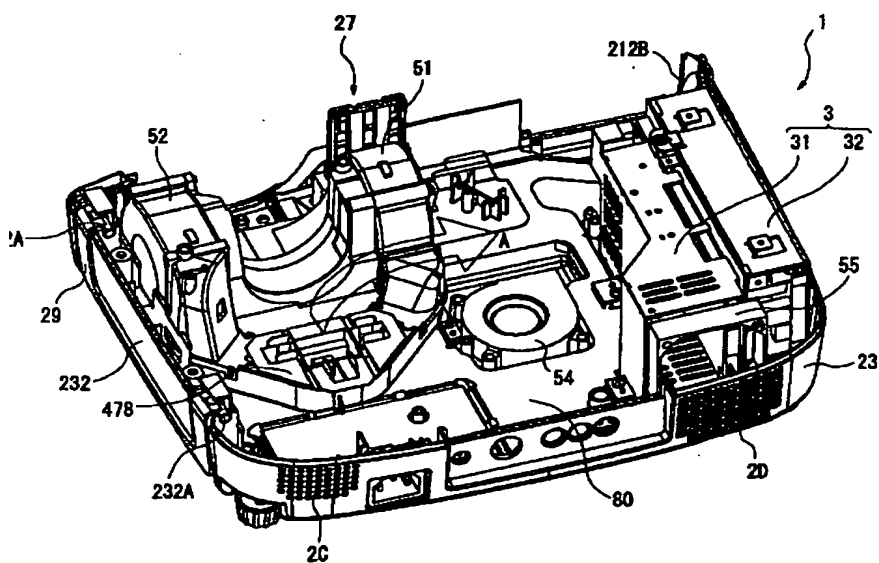
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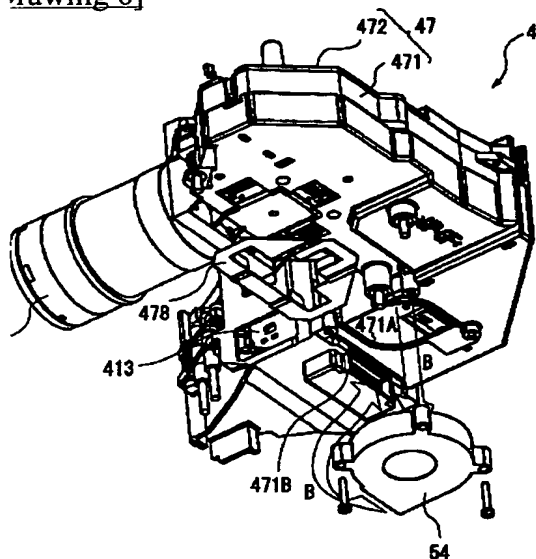
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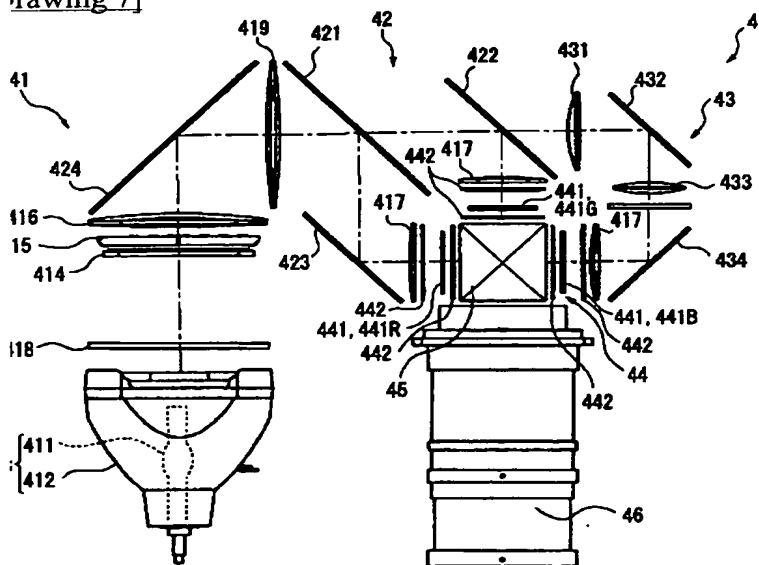
Drawing 5]



Drawing 6]

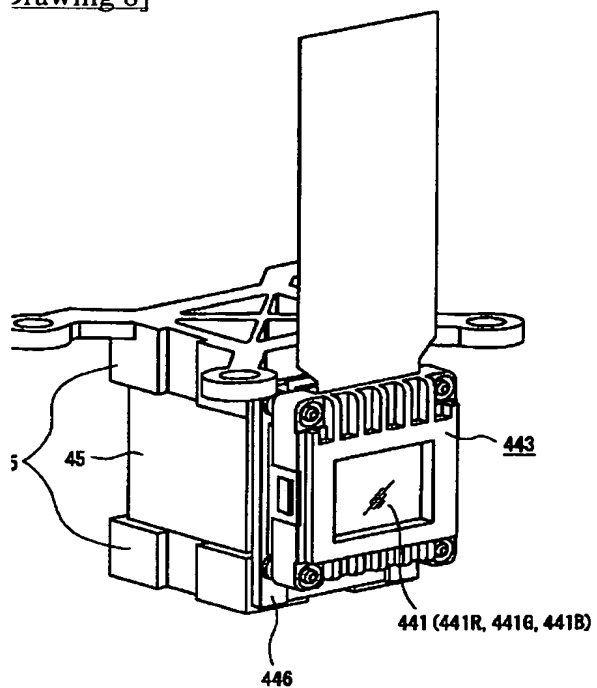


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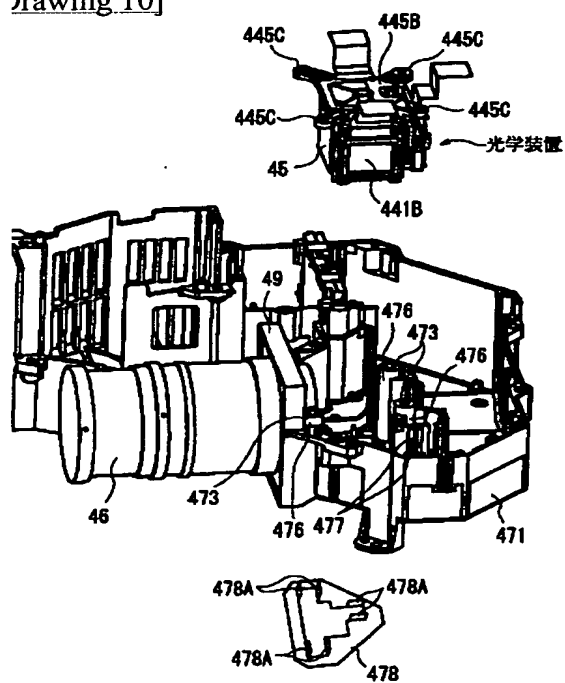




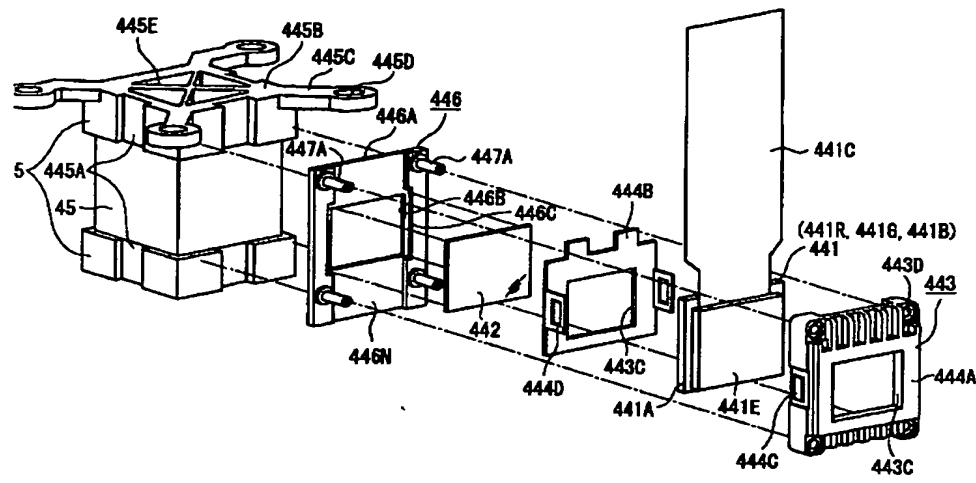
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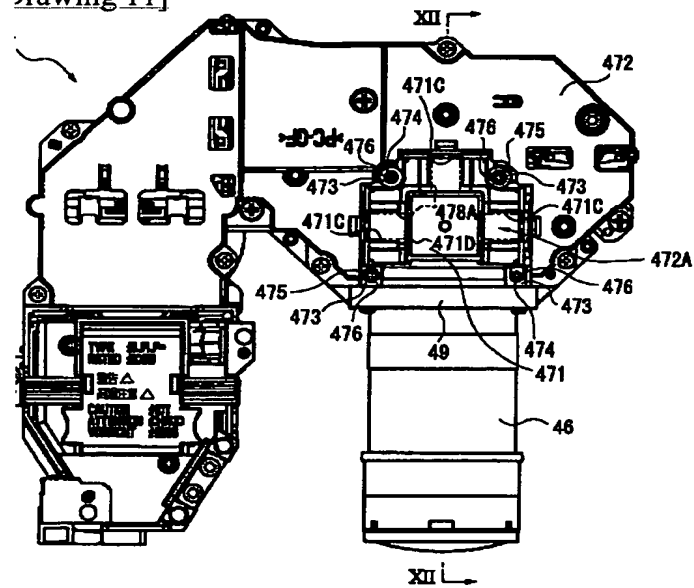
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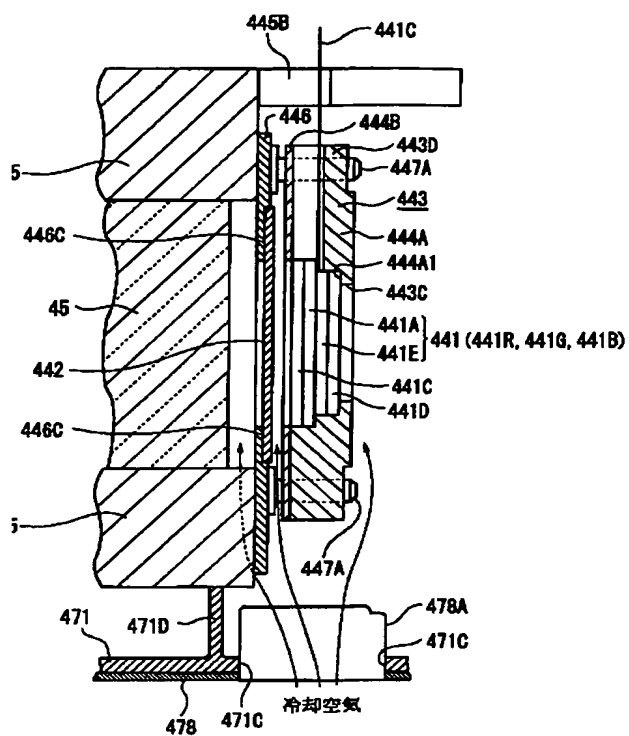
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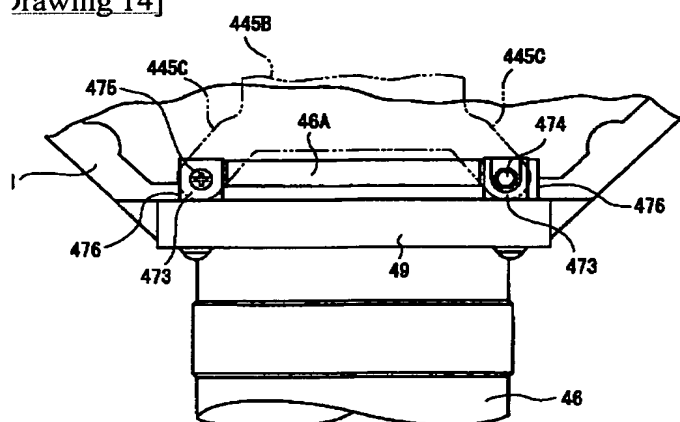
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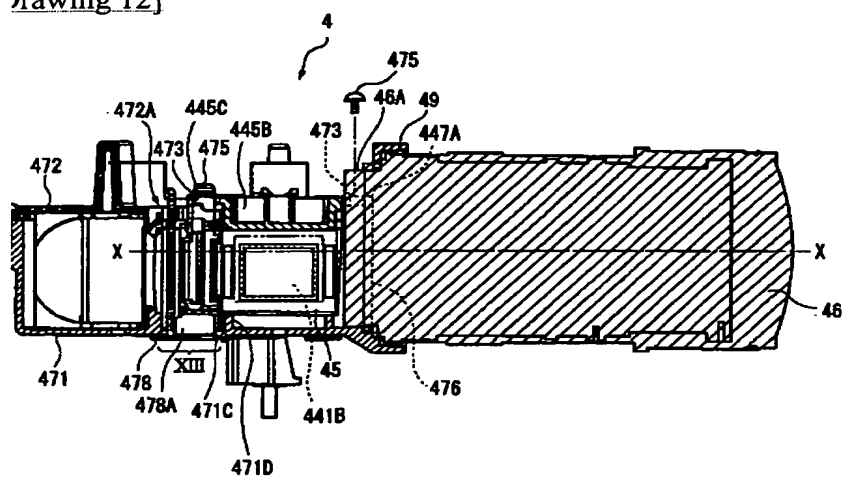
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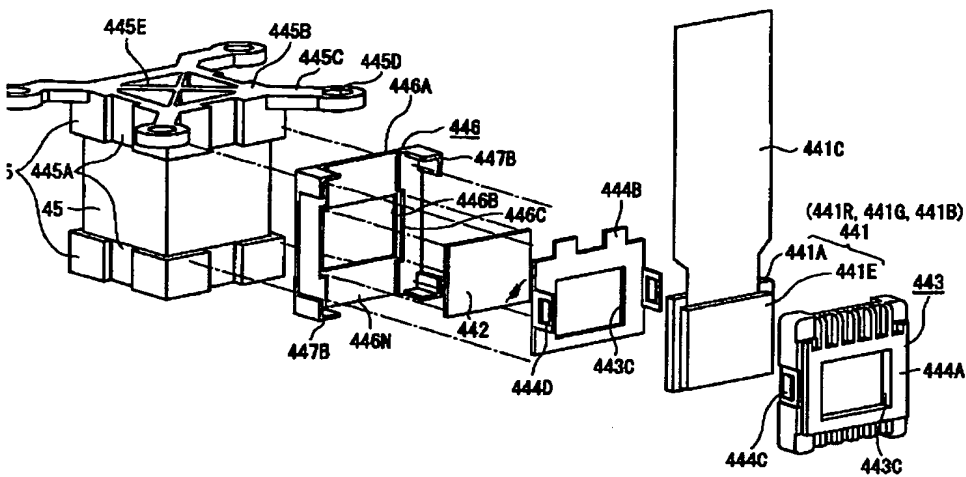
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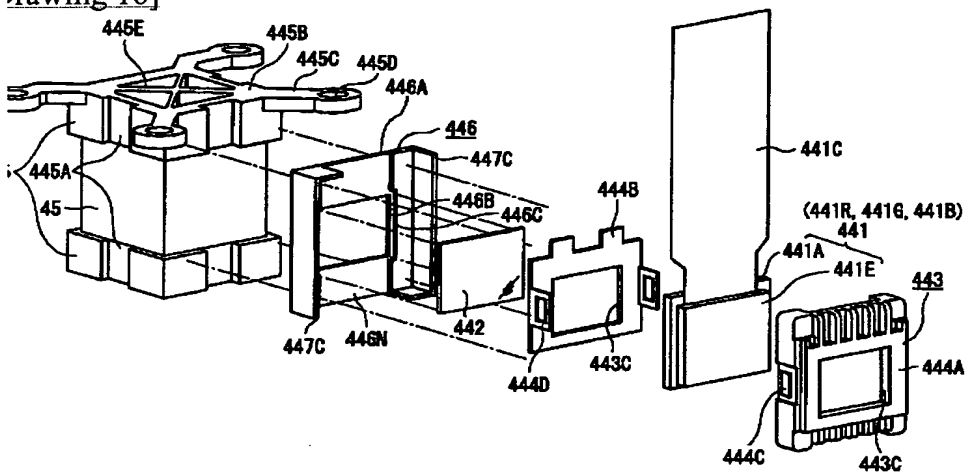
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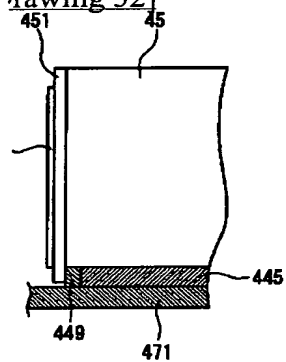
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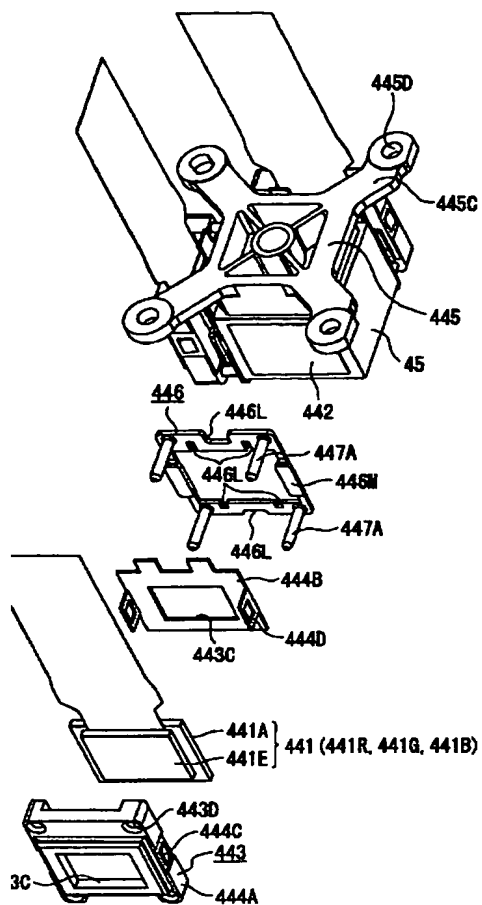
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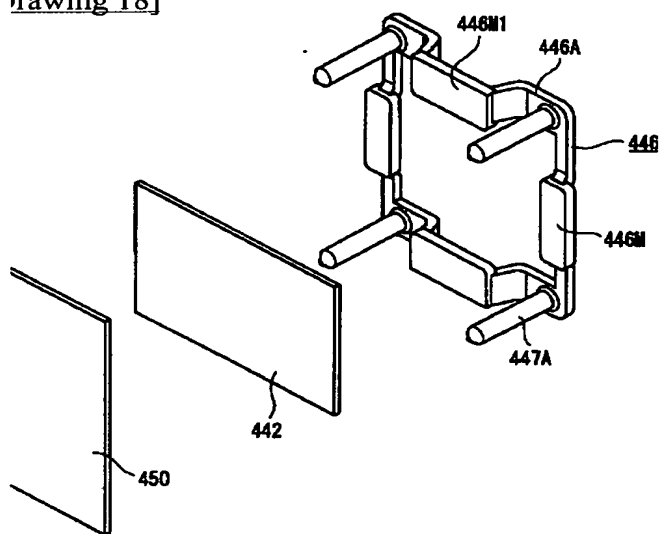
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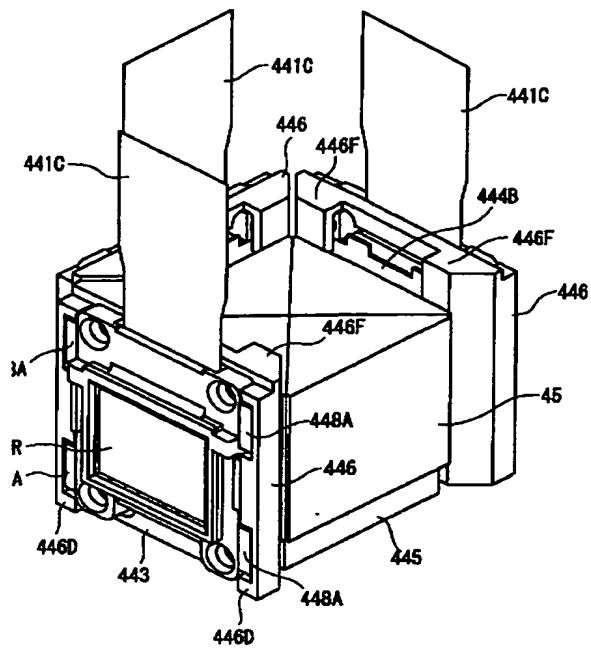
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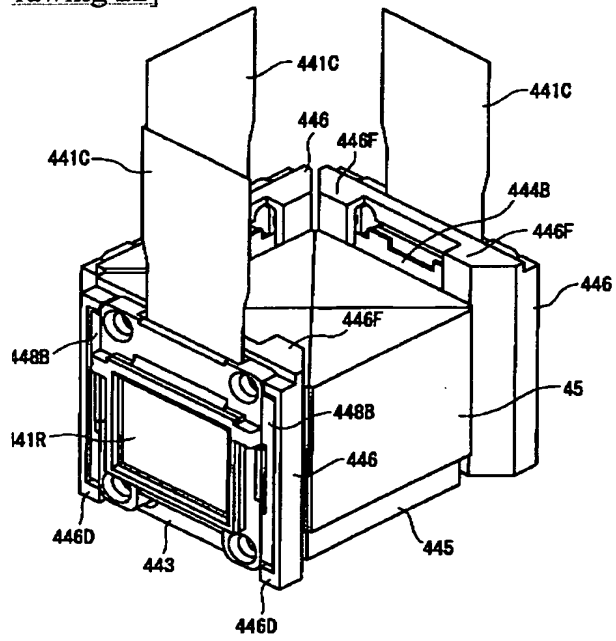
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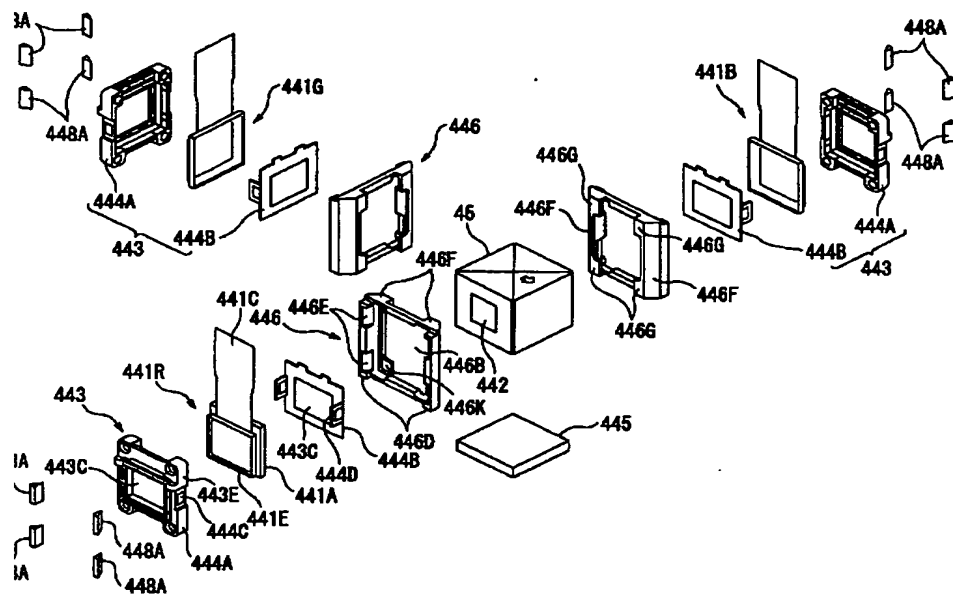


rawing 22]

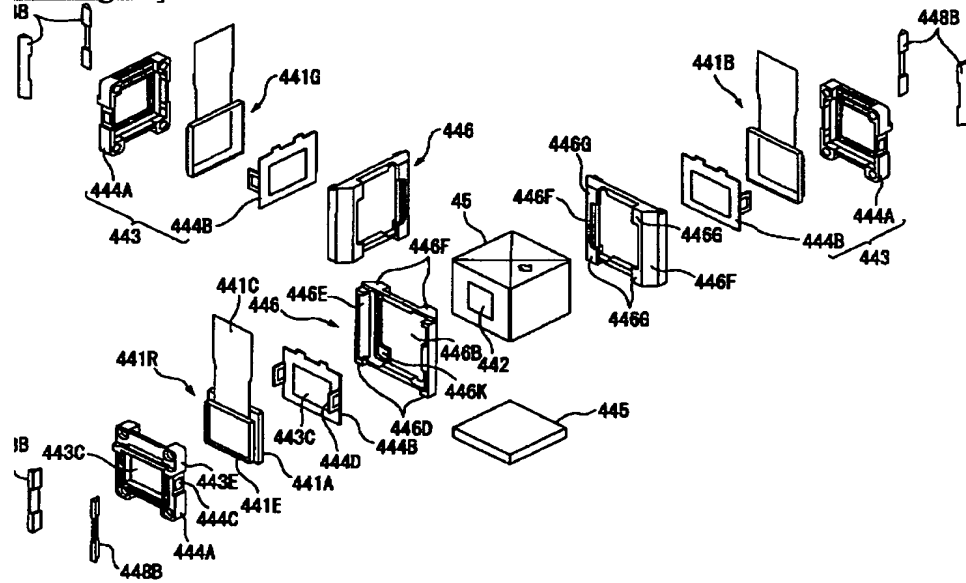


rawing 20]

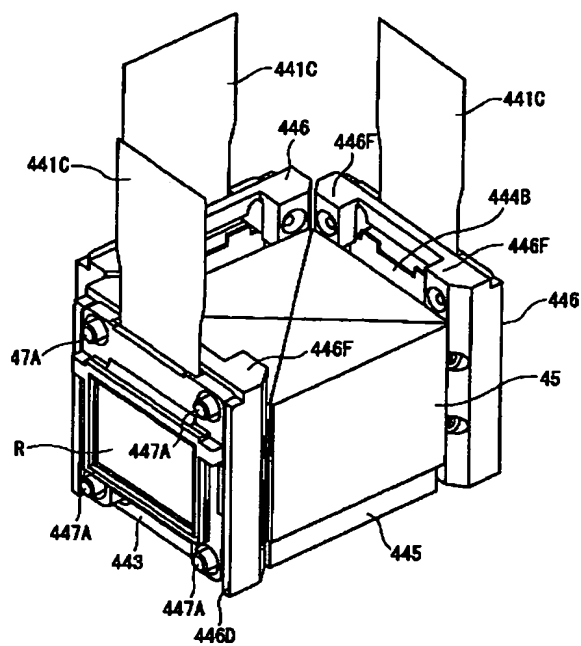




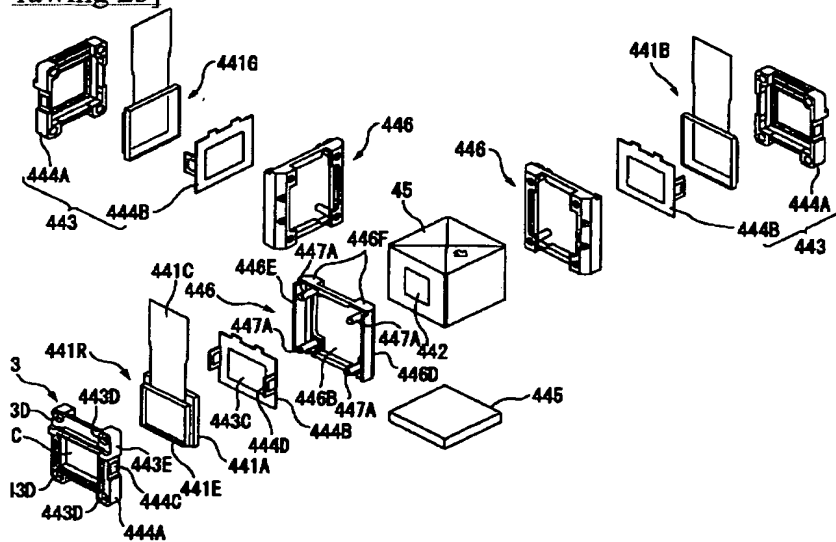
Drawing 23].



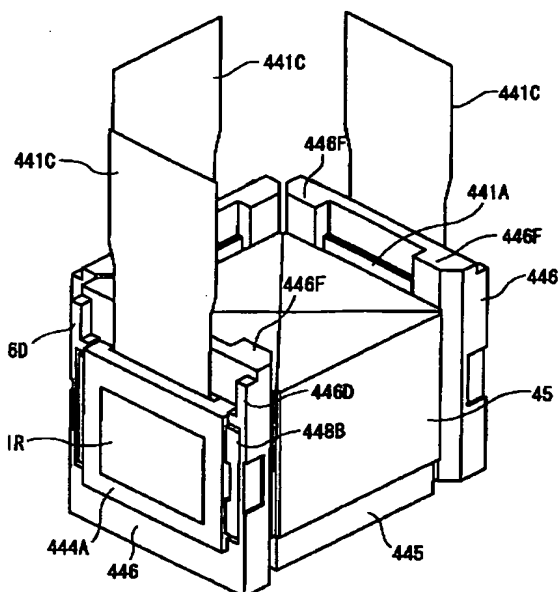
Drawing 24]



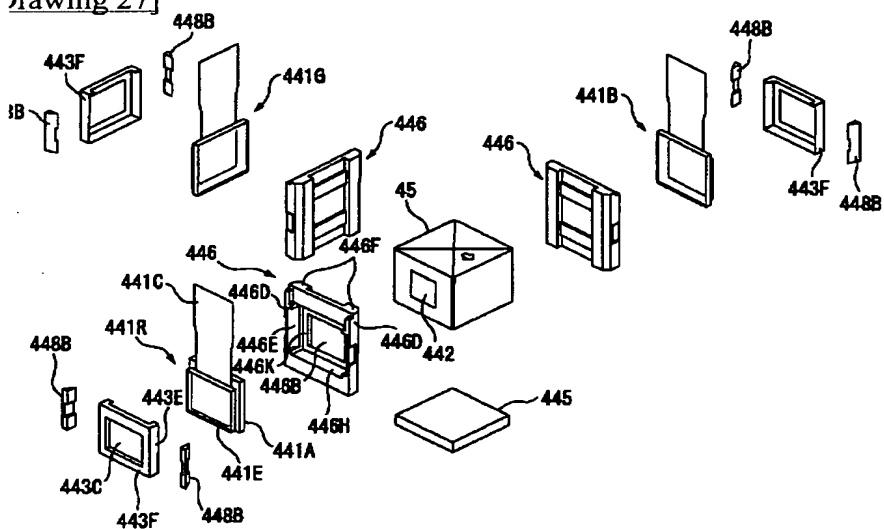
Drawing 25]



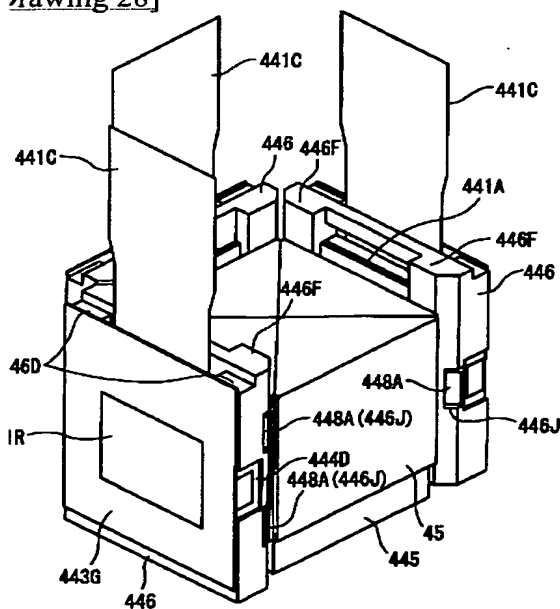
rawing 26]



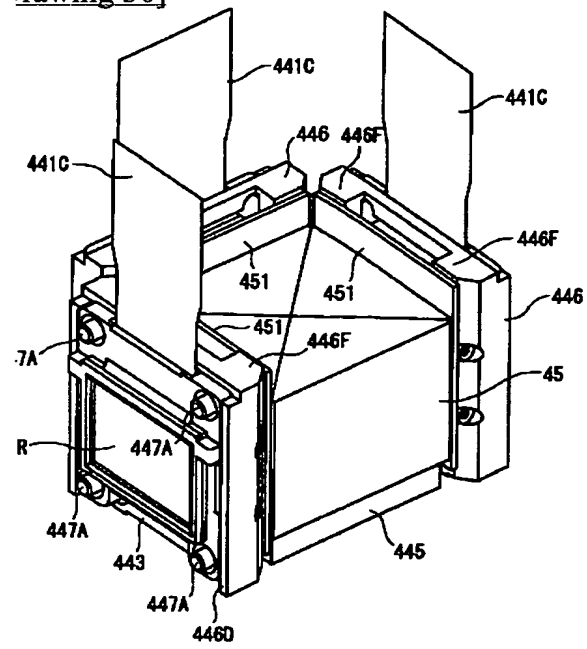
Drawing 27]



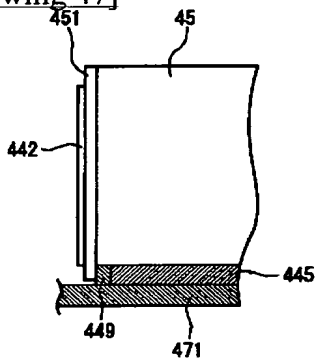
Drawing 28]



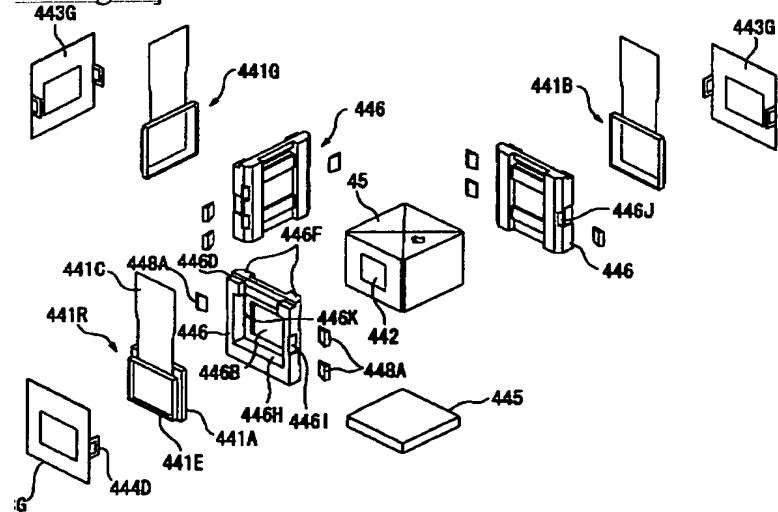
Drawing 30]



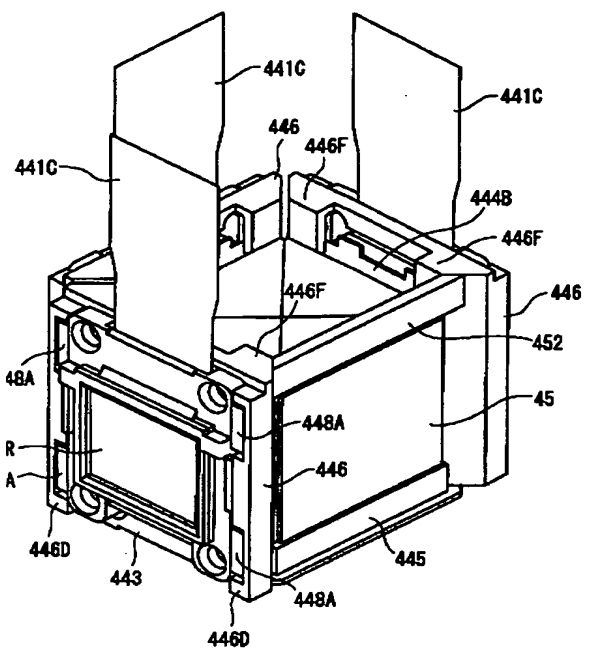
Drawing 47]



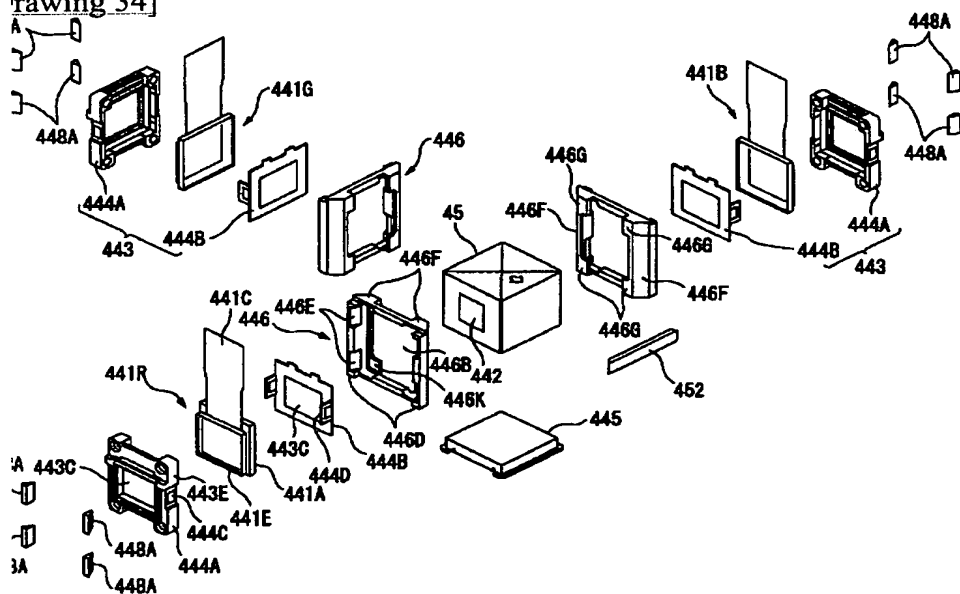
Drawing 29]





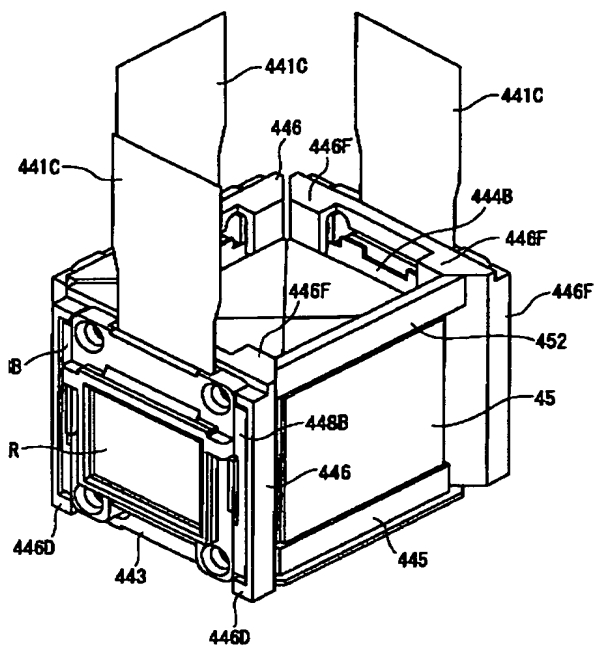


**rawing 34]**

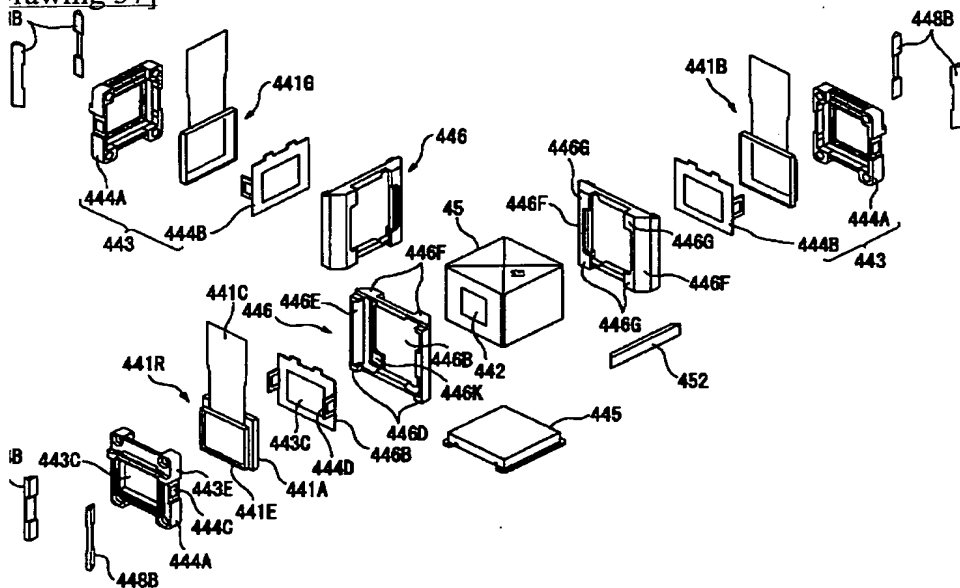


rawing 36]

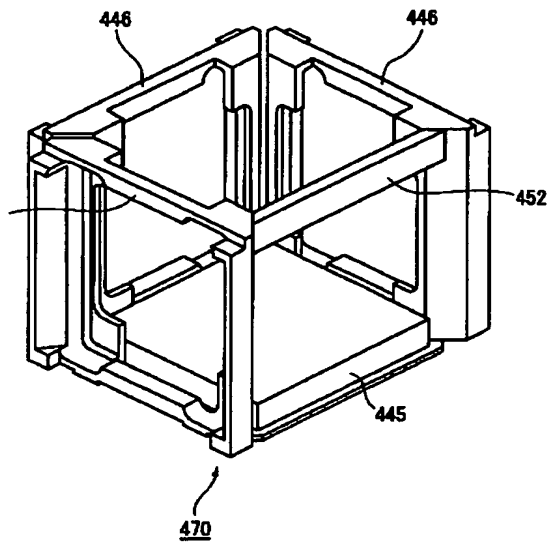




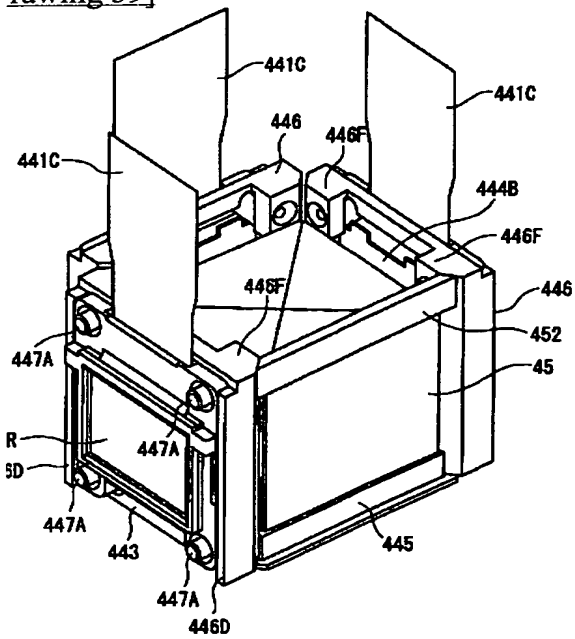
Drawing 37]



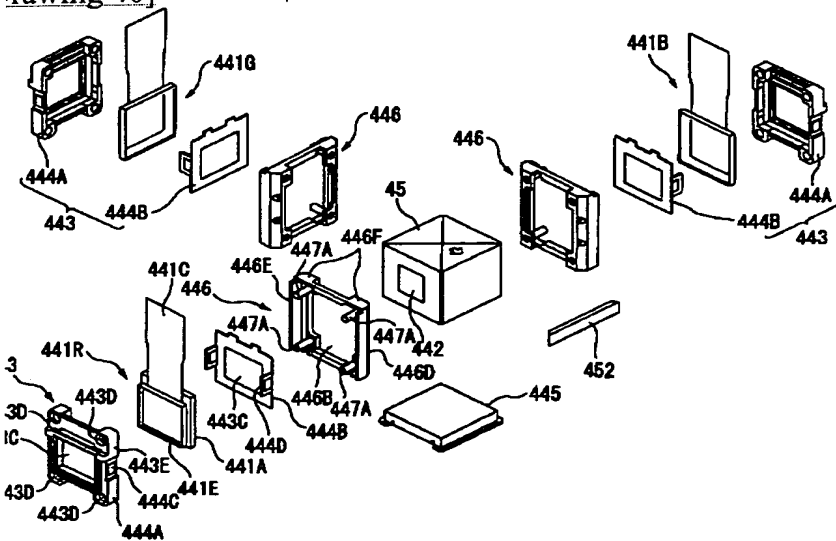
Drawing 38]



Drawing 39]

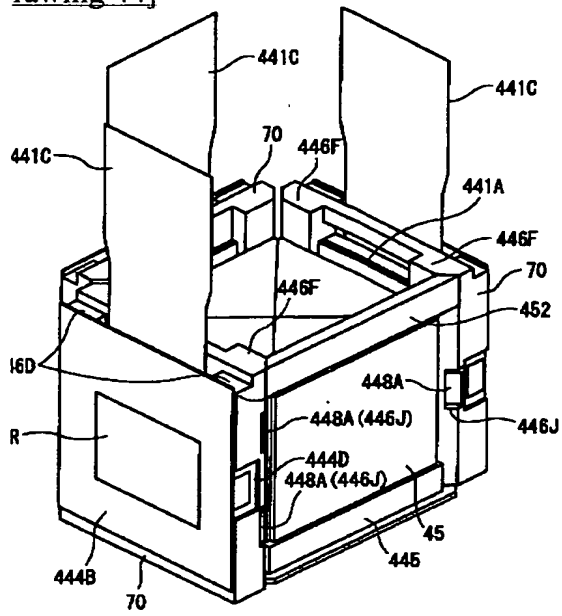


Drawing 40]

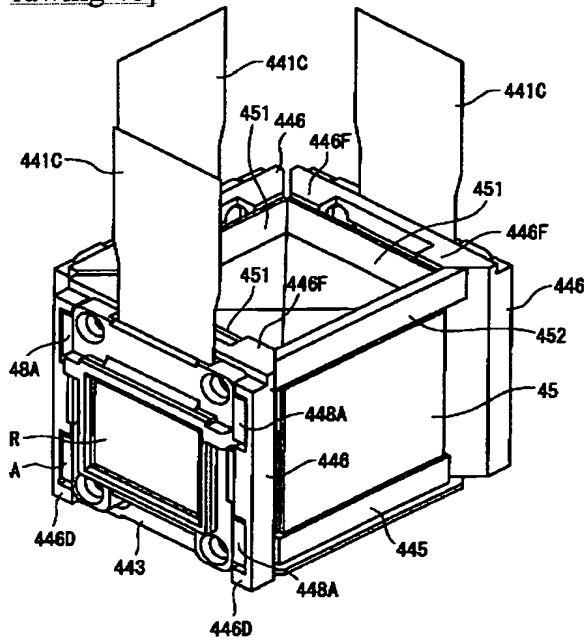




rawing 44]



rawing 46]



rawing 45]

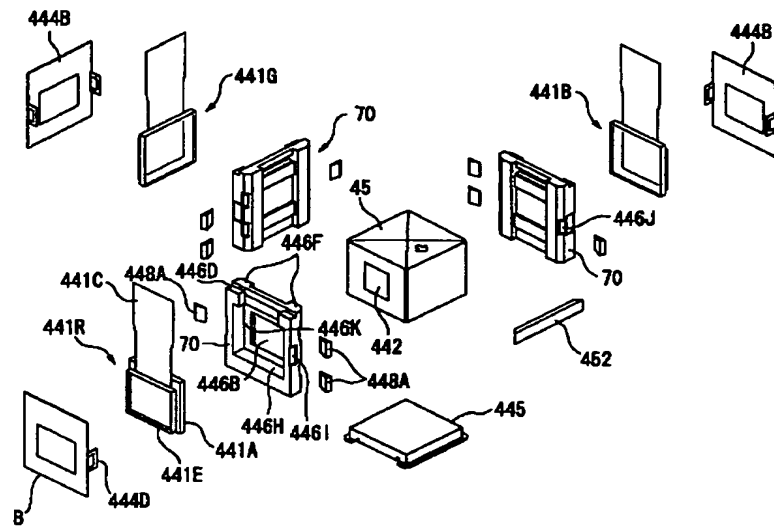
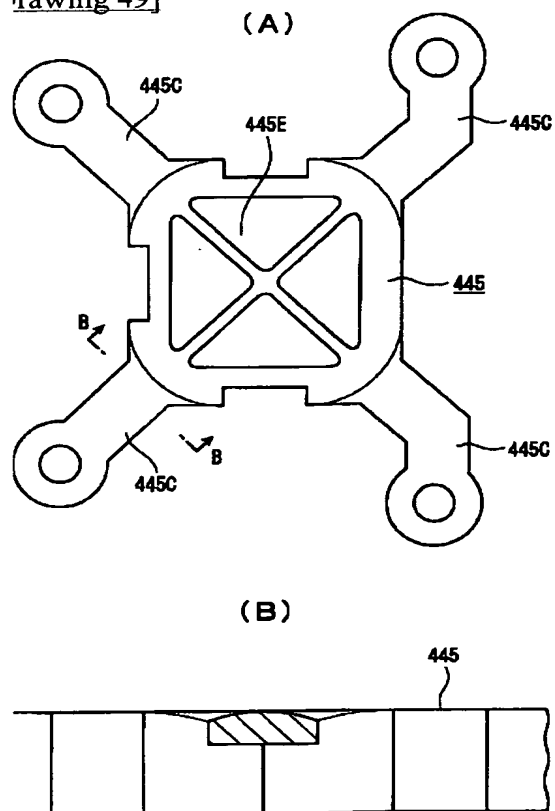


Figure 49]



[translation done.]